



...THE MAGAZINE WHICH INTEGRATES MATERIAL HANDLING EQUIPMENT INTO THE FLOW OF PRODUCTION



The WINNERS of the 1947 FLOW Contest  
See story on page 18



Presenting the Winners in the first FLOW Cost Analysis Contest—see page 18.  
Announcing the Second Material Handling Cost Analysis Contest—see page 51.



Here's everything you want to know about P&H Hevi-Lifts . . . applications, pictures, specifications. It's Bulletin H5-1 — yours for the asking.



## PRODUCTION NEVER PAUSES when parts come *THRU-THE-AIR!*

No sooner is one part lowered into place than the next is on its way. Traveling "thru-the-air" via Zip-Lift Electric Hoist, it moves quickly and directly into position. And this with no effort by the operator save the mere pushing of buttons!

That's the beauty—and economy—of

handling materials "thru-the-air." There's no waste effort, no delay, no loss of valued floor space. Best of all, "thru-the-air" handling lends itself to many different operations, even to carrying the load from the raw material stage right on through to the finished product!

*Your inquiries are invited*

### The "Extras" Are STANDARD EQUIPMENT, Added Values on P&H Hevi-Lift Hoists

- ✓ Shaved gears for lifetime service . . . all bearings grease-sealed. Thermal overload protection against motor burn-outs . . . twin brakes for extra safety.
- ✓ Motors specifically designed and built by P&H for hoist service — high starting torque, frequent reversals, etc.
- ✓ Effortless push-button control . . . available for all motions and with variable speed feature.
- ✓ Transformer provides 110 volts at push-button.
- ✓ P&H's true motor ratings assure against failure at full capacity loads and speeds,



ZIP-LIFT  
HOISTS



TRAV-LIFT  
CRANES



HEVI-LIFT  
HOISTS



HEAVY DUTY CRANE



**ELECTRIC HOISTS**  
4643 West National Avenue  
Milwaukee 14, Wisconsin

**HARNISCHFEGER CORPORATION**

HOISTS • WELDING ELECTRODES • MOTORS  EXCAVATORS • ELECTRIC CRANES • ARC WELDERS

# Let MUSCLE MIKE move your material EASIER, FASTER with NEW 1948 TRANSPORTER

## Amazing *Feather-Touch* Operation

PUBLIC LIBRARY

FEB 11 1948

DETROIT

Thousands and thousands in every kind of industry have been letting Muscle Mike, the mighty midget of power in Automatic's Transporter, lift and move 4000 to 6000 pounds of material with amazing touch-of-thumb ease—have cut their handling costs as much as 60%—released critical labor for more productive work, and ended for employees the grueling labor of manual handling.

Now, in the amazing New 1948 TRANSPORTER, New DUAL-LIFT FOOT PUMP and other new features give you astounding savings in time and labor—new economies in original cost that make Transporter today's best buy in motorized hand trucks. Send the coupon.



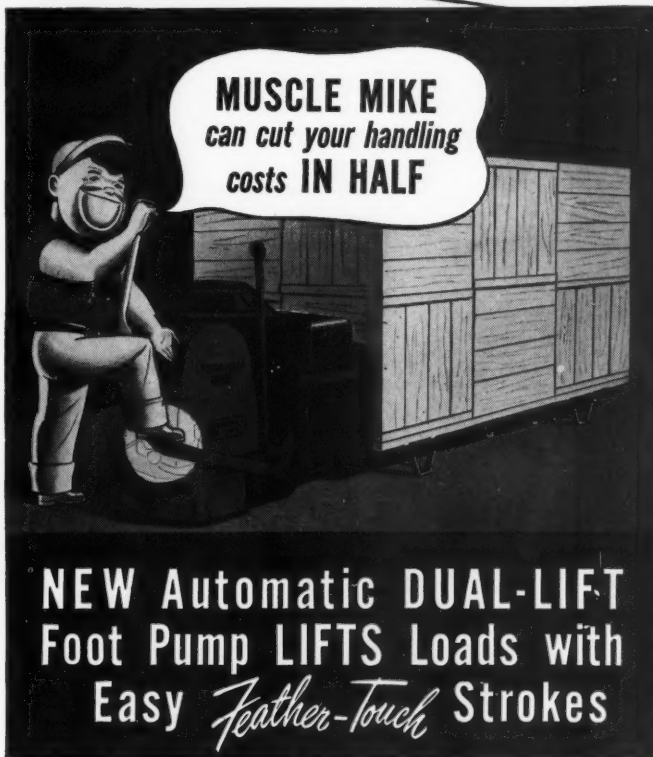
## Push-Button Control MOVES Loads with *Feather-Touch* of Thumb

New 1948 Automatic Transporter MOVES loads just as easily as it LIFTS them! Easy FEATHER-TOUCH pressure of the thumb on the push buttons in the handle, starts load forward or reverse—you guide the load, electrically with no manual effort.

New double-position brake—applied either by raising or lowering guide handle beyond speed positions, provides steering and braking leverage at the same time for hauling or ramps.

Send for facts about this amazing miracle truck—and if you wish, an ATCO Material Handling Specialist will survey your handling costs FREE! Mail coupon.

Look to the Leader—For All That's New



Automatic's new DUAL-LIFT FOOT PUMP now reduces by an average of one-third, the foot pressure necessary to lift up to 6000 pound loads into moving position or maximum height. Quick, FEATHER-TOUCH STROKES get the load to moving position in a matter of SECONDS!

In a six months series of exhaustive and grueling tests, DUAL-LIFT ran day and night lifting the equivalent of a 10,000 pound load at 140 strokes per minute. Results prove that this amazing new Foot Pump will give two or more years service with

no appreciable wear. It can take punishment, is guaranteed to stand up.

Automatic's exclusive new hydraulic lift pump development combines a low pressure (high speed) cylinder for raising the platform or forks into contact with skid or pallet, and a high pressure (low speed) cylinder for raising the load.

Release of pressure on pedal opens valve that permits high speed cylinder to idle while high pressure cylinder is lifting the load, requiring no extra foot pressure on the stroke that lifts the load itself. Use convenient coupon!

### AUTOMATIC TRANSPORTATION COMPANY

DIV. OF THE YALE & TOWNE MFG. CO.

141 West 87th Street, Dept. B-8, Chicago 20, Ill.

( ) Send me complete facts about your New 1948 Transporter and New DUAL-LIFT FOOT PUMP.

( ) Have an ATCO Specialist make a free survey of my material handling costs.

Company Name.....

By..... Position.....

Street Address.....

City..... Zone..... State.....

MANUFACTURERS OF THE FAMOUS TRANSPORTERS, TRANSTACKERS, AND SKYLIFT ELECTRIC TRUCKS  
FEBRUARY, 1948

# You Need **MH** \* to Reduce Costs!

\* "M H" is MASS HANDLING  
—the systematic movement of  
the most units, in the shortest  
time, at the lowest cost.



UNLOADER



UPENDER

PICTURE  
YOUR PRODUCT  
HERE

TOWMOTOR CORPORATION, DIVISION 8, 1226 EAST 152nd ST., CLEVELAND 10, OHIO

SEND FOR FREE BOOK, "The Towmotor Fork Lift Truck & Tractor Guide" which describes all Towmotor Accessories and illustrates the wide adaptability of Towmotor Fork Lift Trucks to hundreds of different handling operations.



**WHY EXPAND YOUR PLANT** if Towmotor Mass Handling will reduce your costs and give you greater competitive advantage? Towmotor Fork Lift Trucks are the busiest machines in a plant—picking up, transporting, stacking and loading materials. They increase production by keeping production machines constantly supplied; they increase storage by stacking higher; they increase profits by cutting handling time on every handling job. Investigate "M H"—the modern way to reduce your handling costs.



**TOWMOTOR**  
THE ONE-MAN-GANG

**Fork Lift Trucks and Tractors**

RECEIVING • PROCESSING • STORAGE • DISTRIBUTION



# Flow

FEBRUARY, 1948

## EDITORIAL DEPARTMENT

MANFRED SCHUELER,  
Editor

HARRY W. CARPENTER,  
Technical Editor

CHARLES N. DEMIAN,  
Associate Editor

PRODUCTION DEPARTMENT  
WM. V. LINAS, Director

CIRCULATION DEPARTMENT  
E. J. HEXTER, Director

FLOW EDITORIAL AND BUSI-  
NESS OFFICES—

HAROLD F. BEHM,  
Business Manager

L. L. OPPENHEIM,  
1240 Ontario Street,  
Cleveland 13, Ohio  
Phone: Prospect 1251

NEW YORK OFFICE—  
LEE HAAS

19-25 W. 44th Street  
Room 412  
New York 18, New York  
Murray Hill 7-3420

CHICAGO OFFICE—  
NORMAN J. LOTT

64 E. Lake Street, Room 1013  
Chicago 1, Illinois  
Andover 4972

LOS ANGELES OFFICE—

ROBERT H. DEIBLER  
2506 West 8th Street  
Los Angeles 5, California  
FE-0303

Subscriptions—By the year, \$3.00;  
Two years, \$5.00; Single copy, 30  
cents.

Foreign Subscriptions—Canada,  
\$4.00 per year, Two years, \$6.00;  
Foreign, \$5.00 per year flat.

Copyright 1948 by THE BOLIVAR  
PUBLISHING CO., Cleveland, Ohio.  
Published Monthly by THE BOLIVAR  
PUBLISHING CO., Cleveland, Ohio.  
IRVING B. HEXTER, President.  
LESTER P. AURBACH, V-P.

The Bolivar Publishing Company,  
Publisher of Flow Magazine, is af-  
filiated with the Industrial Publish-  
ing Company, which also publishes:

APPLIED HYDRAULICS  
DIE CASTING

TAXICAB INDUSTRY  
INDUSTRY AND WELDING  
OCCUPATIONAL HAZARDS  
INDUSTRIA Y SOLDADURA  
REFRIGERATION INDUSTRY



## In This Issue

### Features

THE SECOND MATERIAL HANDLING SHOW—publisher's editorial	17
WINNERS in the first COST REDUCTION CONTEST.....	18
American Industry Rolls on CASTERS AND WHEELS—roundup...	20
Choose the RIGHT FLOOR TRUCK—for your job.....	28
Choosing Pallet Sizes.....	33
How U. S. Industry Uses MAGNETIC SEPARATORS—vital handling aids .....	36
PACKAGING MECHANICS—when you dip before packing.....	46
Announcing SECOND \$1,500 COST ANALYSIS CONTEST.....	51
Procedure for Making MATERIAL HANDLING SURVEY.....	60

### Departments

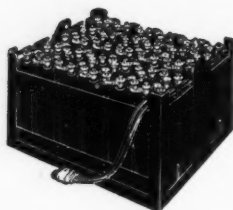
Over the Editor's Shoulder—letters .....	13
New Products—equipment of interest .....	52
New Literature—free material from manufacturers.....	58
Opportunities—lines and personnel wanted, positions available, etc...	58
Men In The News—material men move.....	64
News From the Sales Field.....	65

# THEY GO ALMOST ANYWHERE

One of the unconventional but useful handling jobs often performed by battery industrial trucks is to push or pull heavy loads between cranes. Articles describing modern methods of material handling appear regularly in our **STORAGE BATTERY POWER**. Send for sample copy if you do not already receive it.



**BECAUSE** they are quiet and free from fumes, battery industrial trucks can be used without restriction in virtually any department of the plant. They can even be provided with spark-enclosed construction for operation in locations where fire and explosion hazards may exist.



## *In Industrial Trucks, EDISON Nickel-Iron-Alkaline Batteries Give You These Important Advantages*

- ★ They are **durable mechanically**; grids, containers and other structural parts of the cells are of steel; the alkaline electrolyte is a preservative of steel.
- ★ They can be **charged rapidly**; gassing cannot dislodge the active materials.
- ★ They **withstand temperature extremes**; are free from freezing hazard; are easily ventilated for rapid cooling.
- ★ They are **foolproof electrically**; are not injured by short-circuiting, reverse charging or similar accidents.
- ★ They can **stand idle indefinitely** without injury. Merely discharge, short circuit, and store in a clean, dry place.
- ★ They are **simple and easy to maintain**.

They use low-cost electric power and they use it with maximum economy, because they start instantly, yet consume no power during stops. With electric-motor drive for both traction and lifting, they have a minimum of wearing parts; are easy to maintain; are rarely out of service for repairs.

Thus, they are inherently dependable and economical, and this is especially important where they are working twenty-four hours a day. Here they have the additional advantage of operating from one battery while another is on charge; except for the few minutes needed to exchange batteries, they need not stop for servicing of the power unit.

They are extra dependable and extra economical when EDISON Nickel-Iron-Alkaline Batteries are used. With steel cell construction, a solution which is a natural preservative of steel, and a fool-proof principle of operation, they are the longest-lived and most durable of all storage batteries. *Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, New Jersey. In Canada: International Equipment Company, Limited, Montreal and Toronto.*



## EDISON

Nickel • Iron • Alkaline  
**STORAGE BATTERIES**

...are you caught in this Costly Web?



This spider web of lines is an authentic camera record of the moves involved when a worker transfers small parts from storage truck to bin. Light bulb on worker's wrist makes an actual picture of his time and effort. The same waste is repeated when the parts are taken out of storage.

## Use the Easy **BARRETT** way to get out!

Don't let out-moded handling methods catch you in the web of hidden costs! Cut through it with the modern Barrett System.

Barrett Lift-trucks and Skids solve storage troubles quickly and easily. Materials are simply left on skids right through storage. It eliminates all the loading and unloading, piling and unpling. When materials are wanted from storage—zip!—a sweep of the Lift-truck handle and they are ready to move out.

Other moves in your plant can benefit by this same efficiency... with Barrett Lift-trucks and Skids. Inside, use them in moving materials from room to room or floor to floor; outside, in loading and unloading trucks. Materials are moved so quickly and easily that one man with a Barrett can actually outwork 3 or 4! Your Barrett engineer will gladly show you how. For more information, write...



Send for your  
free copy of the  
Barrett Junior  
Catalog.

### **BARRETT-CRAVENS COMPANY**

4619 South Western Blvd. • Chicago 9, Illinois

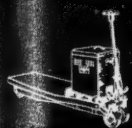
Representatives in All Principal Cities

Canadian Licensee: S. A. Armstrong, Ltd., Toronto, Canada

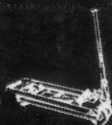


# BARRETT

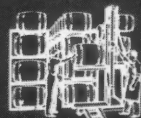
ONE MAN DOES MORE THAN 3 OR 4... WITH A BARRETT



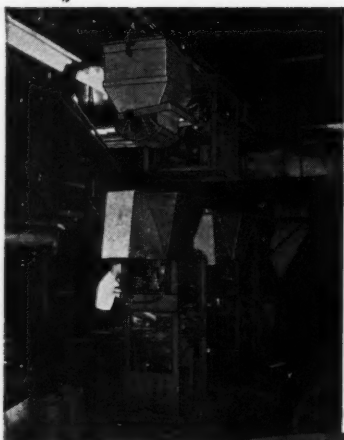
**Barrett  
Handling  
Equipment**



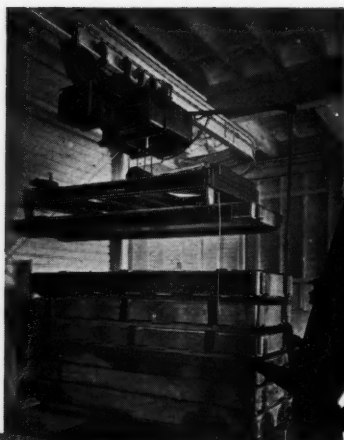
PORTABLE  
ELEVATORS



STEEL  
STORAGE RACKS

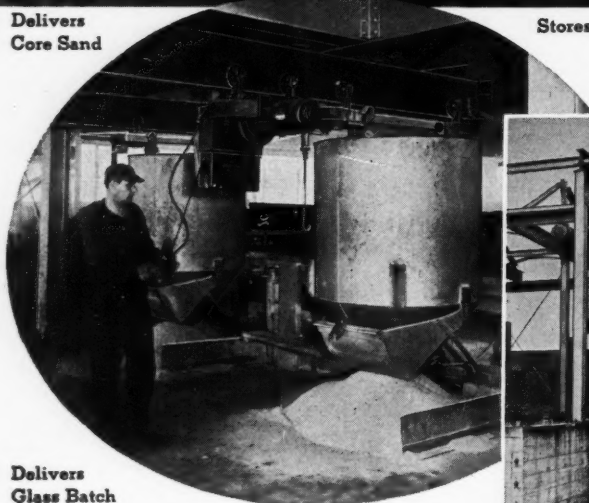


Delivers  
Core Sand

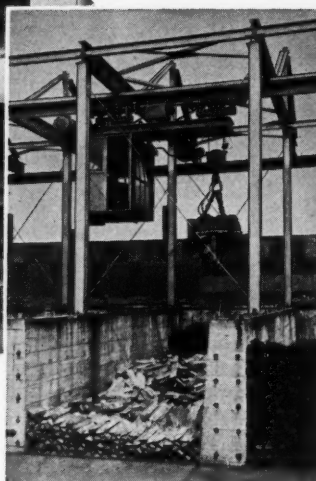


Stores Sheet Steel

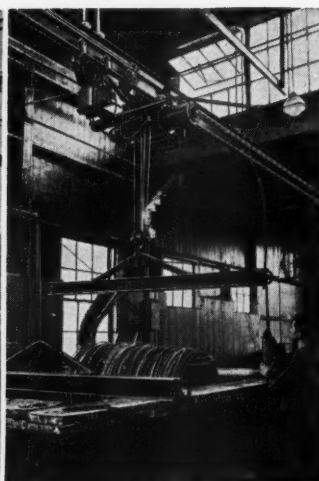
**MONOTRACTORS**  
*Do the  
Hard Jobs*



Delivers  
Glass Batch



Stores Pig Iron



Cleans Wire Rod

American MonoTractor units perform automatic overhead handling operations with extreme accuracy and reliability. From unloading raw material to shipping finished products, these automatic carriers save costly handling labor by enabling unskilled help to spot heavy and cumbersome loads accurately and safely. American MonoTractors can be applied to carriers operating on any smooth

bottom track. Let an American MonoRail Engineer show you how production goes up, handling costs go down when the hard handling jobs are done with American MonoRail MonoTractors and Systems.

SEND FOR BULLETIN C-1.

A 56-page book showing successful applications of American MonoRail Systems.



**THE AMERICAN MONORAIL COMPANY**

13129 ATHENS AVENUE

CLEVELAND 7, OHIO



**COMBINED  
ENGINEERING  
SKILL MAKES  
BETTER  
BATTERIES**



**Another way you profit by the  
GOULD-PHILCO merger\***



The two top-notch battery engineering staffs of Gould and Philco have joined forces—with greater profit to you. Developers of the famous "Thirty" and the "Kathanode" motive power batteries; the "Plante" and the "Flote" stationary batteries, these engineers have paced battery development for the past twenty years. The combined staffs, you may confidently expect, will continue to lead with advanced battery design.

Gould Batteries are the "Choice of Engineers" today. From Gould will come the "Battery of Tomorrow."

\*The Storage Battery Division of Philco Corporation was merged with the Gould Storage Battery Corporation on June 28, 1947. The consolidated organizations are operating under the name of Gould.

**GOULD**

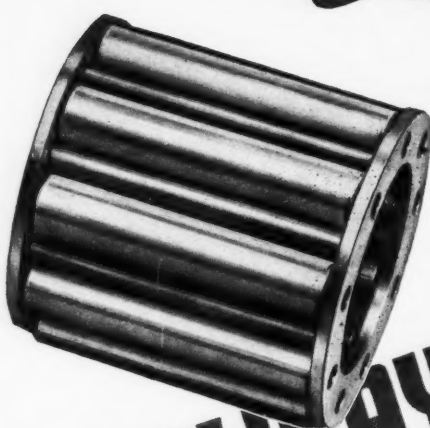


**Gould Storage Battery Corporation**  
Trenton, New Jersey

**BATTERIES**

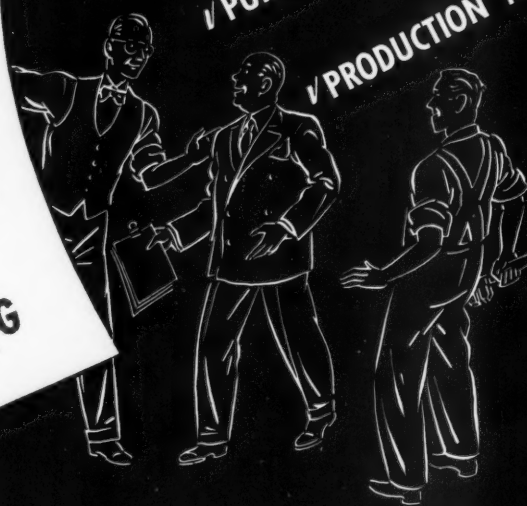
FEBRUARY, 1948

*Satisfies all 3*



**ROLLWAY**  
TYPE UN *Steel-Cage*  
ROLLER BEARING

✓ ENGINEER  
✓ PURCHASING AGENT  
✓ PRODUCTION MAN



## ASSURES LOW COST SERVICE in material handling equipment

*If those statements sound like "just another boast" . . . all we ask is a chance to prove them . . . in less than 100 words!*



**TO THE ENGINEER . . .** The new, special Type UN Rollway Roller Bearing is specially suited for material handling equipment service permitting use of commercial fits and materials. They do the job they are meant for with minimum bearing drag and wear. Even when mounted on soft steel shafts, the rollers greatly reduce "tracking action."



**TO THE PURCHASING AGENT . . .** Even in a seller's market, industry chooses the material handling equipment which gives good service at lower cost. Type UN or AUN Roller Bearings are cheaper to buy than other roller bearings now on the market . . . and in some cases cheaper than plain bearing installations.

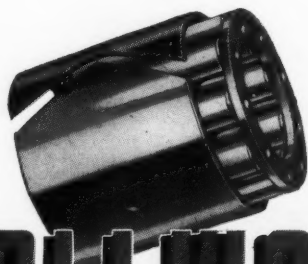


**TO THE PRODUCTION MAN . . .** Here's a bearing that saves you assembly headaches . . . speeds production . . . and cuts costs. With Type AUN, you simply press the sleeve in the housing at the unit-assembly bench and then slide the rollers on the shaft at the group assembly station.

**Every saving in the over-all cost  
of your equipment is smart business**

Let our Rollway Sales Engineers tell you more about the low-cost, highly dependable Type UN Rollway Bearing. See it. Compare it. You'll agree there is no better bearing for the job. Call your nearest Rollway office.

**FREE SERVICE** If you have a bearing problem, our engineers will gladly help you select the exactly right bearing for your requirements. Write us today. All information held confidential.

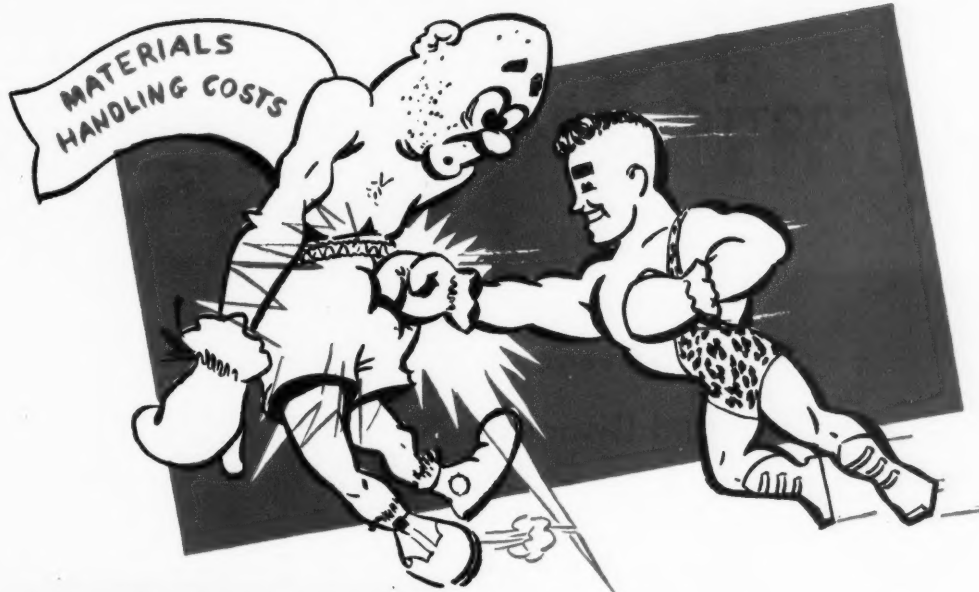


TYPE  
AUN

# ROLLWAY BEARINGS

**ROLLWAY BEARING COMPANY, INC.**  
Syracuse, N. Y.

**SALES OFFICES:** Philadelphia • Boston • Pittsburgh • Cleveland • Detroit • Chicago • Minneapolis • Houston • Los Angeles

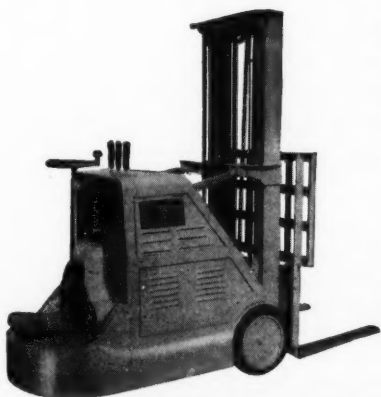


## **MOBILIFT "The Mighty Midget"**

### **A Cost Cutter with a Punch!**

It's a tough battle, this constant fight to keep production costs down. Shortages keep material costs up. Labor costs are high and steadily increasing. Taxes are as high as ever.

But there is one logical way out—and that is in handling materials. Handling costs are no match for Mobilift—affectionately known as "The Mighty Midget" by thousands of users. Mobilift, because of its size, its ease of handling and its all around operating speed has many economies. It makes more trips per hour—moves more tonnage per day than any other fork lift truck on the market. It saves time, space and human energy. It cuts handling costs in every department from the loading platform to the warehouse. Put the Mighty Midget to work cutting costs in your plant or warehouse. Send for our 16-page illustrated folder on modern Mobilift operation.



#### **MOBILIFT CORPORATION**

835 S.E. Main St., Portland 14, Oregon

Please send me your illustrated folder on  
Mobilift operation. F-2.

Name

Firm

Address

City  State



SALES OFFICES  
IN MAJOR CITIES

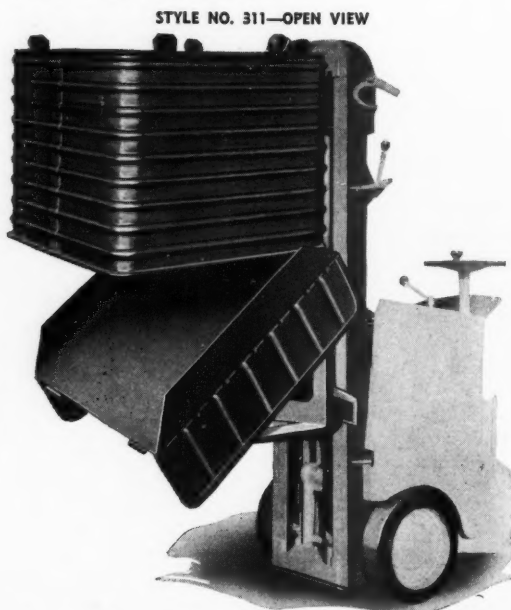
# POWELL

## BOTTOM DUMP ASSEMBLIES



STYLE NO. 310  
BOTTOM DUMP BOX

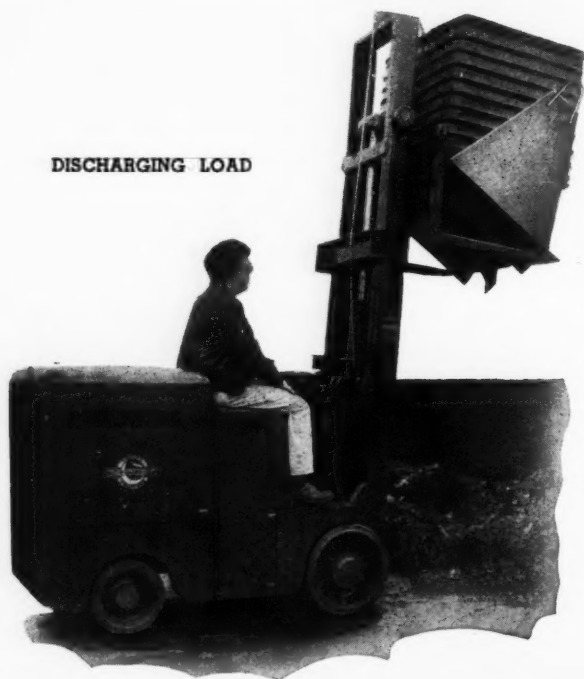
Salvage  
and Disposal  
Problems  
are made easy



Powell Gravity Bottom Dump Boxes are correctly engineered for safe transportation and discharge of load.

These boxes made in several types designed for your particular requirement.

DISCHARGING LOAD



STYLE NO. 312  
ROLL-OVER FORK BOX

*Representation in Principal Cities*

**THE POWELL PRESSED STEEL CO.—HUBBARD, OHIO**

*"ORIGINATORS of Cold Formed All Steel Handling Equipment"*



# Huge Industrial Plant Keeps Big Truck Fleet At Top Efficiency

**GENERAL ELECTRIC RECTIFIERS**  
located at six strategic points to cut  
off-duty time and speed operations



A bank of four G-E rectifiers is strategically located at the scene of action, to keep four busy trucks on the job. The trucks are on 24-hour service, switching batteries between shifts. Underground conduit connections, quick roll-out racks, and automatic charging contribute to easy operations.

Helping to solve a difficult materials handling problem at Bakelite Corporation's Bound Brook, N. J., plant, twenty-two General Electric copper-oxide rectifiers are used to meet the requirements of widely separated truck operations. Charger stations are located in various manufacturing, storage, and shipping areas, in order to be readily available for between-shift charging. They are also used for giving truck batteries a quick boost if it is needed during work periods.

These efficient General Electric chargers service a number of different types of trucks which have 12-, 15-, or 18-cell batteries. Some are in constant use, others are on a standby basis.

Shipping department truck batteries are charged at this ten-rectifier station. Batteries are moved by chain hoist to charging platform, and connected to cable leads running to individual rectifiers. Once the batteries are on charge, they require no further attention, because the G-E charger automatically cuts off when the charge is completed.

But all have had a consistently fine record of low maintenance and economical operation. Many have had no repairs of any kind for two years, and there has not been one major failure in the five years in which this type of equipment has been in use at Bakelite.

Performance like this is typical of General Electric charger installations throughout industry. If you would like to know how this equipment can make your materials handling problems easier, too, we'll be glad to send you a copy of our book *Aids To Economical Faster Materials Handling*. Just write to Section A83-236, Appliance and Merchandise Department, General Electric Company, Bridgeport 2, Connecticut.

**GENERAL  ELECTRIC**

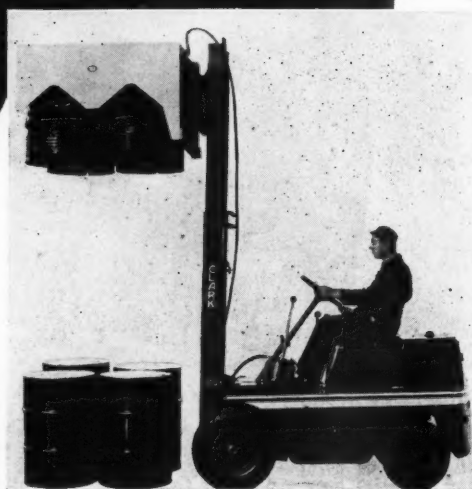
FEBRUARY, 1948

**HANDLE DRUMS  
EASILY AND QUICKLY WITH A**

**.TRAY-HART.  
CARRIER**



**EFFICIENTLY HANDLES  
STEEL DRUMS OF 55 GAL.  
CAPACITY OR ANY SIZE  
SPECIFIED —**



PATENT PENDING

Designed to meet the requirements of one of the major oil companies, the **TRAY-HART CARRIER** represents over two years of experimentation and field tests.

It quickly pays for itself in saving in man hours and the greater efficiency with which loads can be handled. Conversion from forks to **TRAY-HART CARRIERS** can be made in a few minutes without tools.

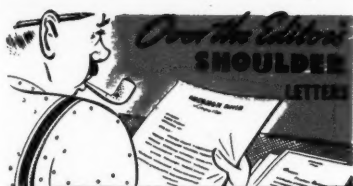
Rugged high tensile steel construction withstands severe service and reduces maintenance costs. May be installed on any Gasoline or Electric Powered Fork Truck.



Width 48" - length 53" - weight app. 700 lbs. Handles 2" diameter and 6" height variations in drum dimensions.

**ENGINEERING BROCHURE NO. 505 AVAILABLE ON REQUEST**

**PALLET ENGINEERING COMPANY, Distributors**  
725 Second Street • San Francisco 7, California



**To FLOW:**  
*Below-The-Hook Device*

Enclosed you will find a rough drawing of a "C" clamp which we are interested in obtaining. This clamp will be used in handling large coils of sheet steel . . . with a maximum weight of 15,000 pounds per coil. We would like to be put in touch with a source for this type of clamp.—John D. Jackson III, The Kawneer Co., Lexington, Ky.

*Reader Jackson was referred to four possible sources for this equipment.—Ed.*

**To FLOW:**  
*From Denmark*

From Mrs. Joran Birkeland, Cultural Officer of the United States Information Service in Copenhagen, I have been given your address as publishers of FLOW. I should be very grateful if you would forward to me at your earliest opportunity a sample copy with details of foreign subscriptions.—Leon Jorgensen, Osterbrogade 64, Copenhagen.

**To FLOW:**  
*From Sweden*

We should be much obliged to you for sending us a specimen copy of your periodical FLOW.—T. Landberg, Acquisition Librarian, Royal Institute of Technology Library, Stockholm.

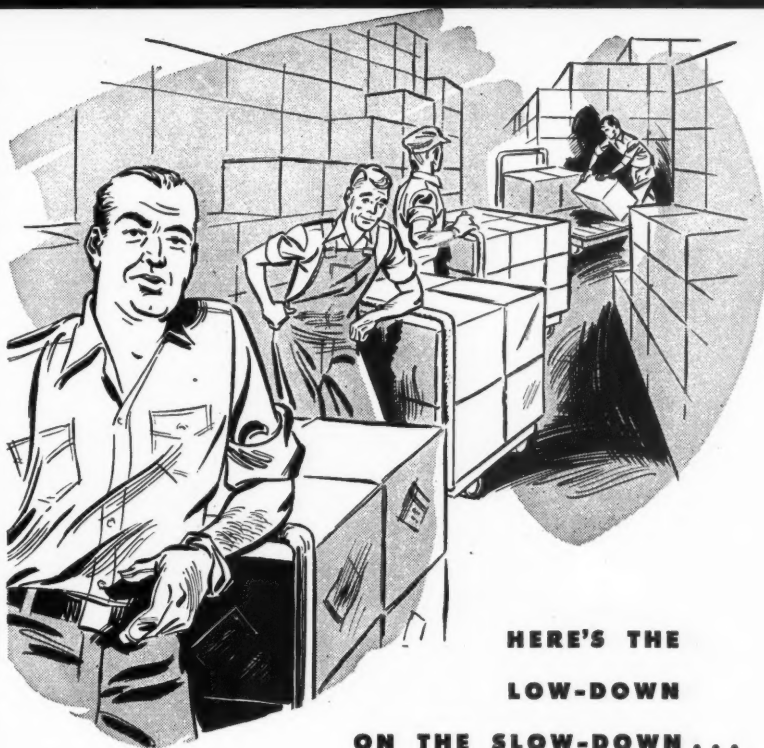
*The universal interest in material handling is attested by the fact that FLOW's foreign subscribers are located in more than 20 foreign countries.—Ed.*

**To FLOW:**  
*For Material Handling Course*

In preparing some mimeographed material for our new course in Material Handling, I have been referring to Flow Magazine quite frequently.

As an introduction to the subject, I can think of no better words than those of R. W. Mallick in "Let's Face the Problem" (March 1947, page 51).

May I have permission to in-



**HERE'S THE  
LOW-DOWN  
ON THE SLOW-DOWN . . .**

There's no mystery about it. It's just that men with loaded trucks simply can't move any faster in crowded aisles and on congested loading platforms. But it's a slow-down just the same . . . and a costly one.

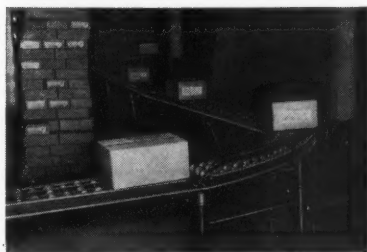
There's no necessity for this expensive loss of time. Two men . . . one at each end of a Rapid-Wheel Gravity Conveyor line . . . can do the work of a dozen men with trucks. They'll keep goods moving smoothly . . . with little effort. If it is going upstairs, couple the line to a Floor-Veyor (an inclined power-belt conveyor). If it's to be stacked, hook on a Rapid-Power Booster. The job will be done in less time . . . for less money . . . with less manpower.

Remember . . . the cost of handling materials, parts, and products runs as high as 30% of total production costs. It's an item that deserves careful thought. We'll be glad to make an analysis of your operations and suggest the proper equipment. There's no obligation.

**THE RAPIDS-STANDARD CO., INC.**  
377 Rapistan Bldg., Grand Rapids 2, Michigan

Your local Rapids-Standard representative is listed in your classified telephone directory.

*It's wise to conveyerize*



**Rapids-Standard**  
**MATERIAL HANDLING EQUIPMENT**





Factory assembled units: Heavy-duty tire, separate tube, heavy-duty demountable wheel and rim; 8" to 22" o. d. for loads of 180 to 1900 pounds per tire.

Manager, Industrial Tire Sales, Dept. 1  
The General Tire & Rubber Co.  
Akron, Ohio

Dear Sir,  
Please send me, without cost or obligation, your new catalog which tells how to save time, labor and money with General Industrial Tires.

Name \_\_\_\_\_  
Title \_\_\_\_\_  
Company \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_

clude this article in our manual?—J. M. Apple, Prof. of M. E., Michigan State College, East Lansing.

*Permission is granted.*

#### To FLOW:

*Tricky*

Tsk! Tsk! Look at the September, 1947, cover photo.

I was surprised to see your "cover boy" seemingly pushing a loaded rack truck with swivel casters in a position contrary to the normal directional flow.

How about telling us how he does it? It would be a pleasure to hear from you.—B. E. Weber, Material Handling Specialist, Chicago.

*Nothing to it, Mr. Weber—and our hats off to you for spotting something only one in thousands would notice. Here's how this difficult feat was accomplished. The photographer pushed the truck into position, then posed the operator and said, "Make like pushing." The photog squinted through his view finder. "Advance your left foot," was the second request. The scene photographed might be called motion at rest, and that's how the casters faced one way while the movement was in the opposite direction. Said another FLOW reader about the same cover photo: "That truck has given me an idea for a piece of castered equipment that ought to be offered commercially."—Ed.*

#### To FLOW:

*Pneumatic Equipment*

We wish to thank you very much for your assistance given us in locating pneumatic material handling equipment. The information you supplied was exactly what we needed—Edward H. Allan, Engineer, Industrial Equipment Ltd., Vancouver, B. C.

#### To FLOW:

*From England*

Please send us a copy of FLOW Magazine. One of our customers would like to see a number before opening a subscription.—Arthur F. Bird, Importer of American Books and Periodicals, London.

#### To FLOW

*Helps Purchasing Agents*

In the April 1947 issue of your magazine appeared a very interest-



ing article entitled "Where to Put Everything."

We are an association of purchasing agents and one of the daily problems of many of our members is stores handling. Our Association publishes a monthly magazine called **PACIFIC PURCHASOR**, which is distributed to all members and it occurred to us that the article mentioned would be of interest to our membership. We are wondering whether you would grant us permission to run the article in some future issue of **PACIFIC PURCHASOR**. We would naturally be glad to give the usual credit line.—R. F. Hendrick, Chairman Publication Committee, Purchasing Agents Assn. of Northern California, Inc., San Francisco.

#### To FLOW: For Safety

Here at our East Springfield Works we have been very much interested in your magazine. As supervisor of Health and Safety, I recommend the circulation of the magazine to all departments interested in handling materials.

You are no doubt aware that a large number of accidents occur during the course of material handling. We feel that we have found in your magazine a medium for an exchange of ideas which enable us to improve our methods and equipment.

We were also greatly interested to read the article which was written by Mr. R. W. Mallick of our Headquarters Manufacturing Engineering Department. This was in the September, 1947 issue.

In a recent issue, one of your advertisers used a picture of a truck driver following an unsafe procedure, namely, driving an electric truck behind a load which is so high and wide that he cannot see where he is going. We call this to your attention in the hope that you will get in touch with your advertiser and call their attention to this since a procedure of his type is highly inefficient, if it is possible, and is also extremely hazardous.—C. R. Reid, Industrial Relations, Westinghouse Electric Corp., Springfield.

"Procedure for, Making a Material Handling Survey," a Second National Material Exposition digest begins on Page 60.

# Just Off the Press!



## ELEVATOR COMPANY

Serving the  
Industrial needs of America  
through 256 local offices

— a diagram-packed booklet that gives you facts you need to know before "elevating" a building where power trucks are to be used. Gives elevator sizes and capacities and practical installation data.

Please send new Otis Bulletin B-705F which shows how and where Pow-R-Truck Elevators differ from conventional freight elevators.

Clip and mail to Otis Elevator Company, 260 Eleventh Avenue, New York 1, N. Y.

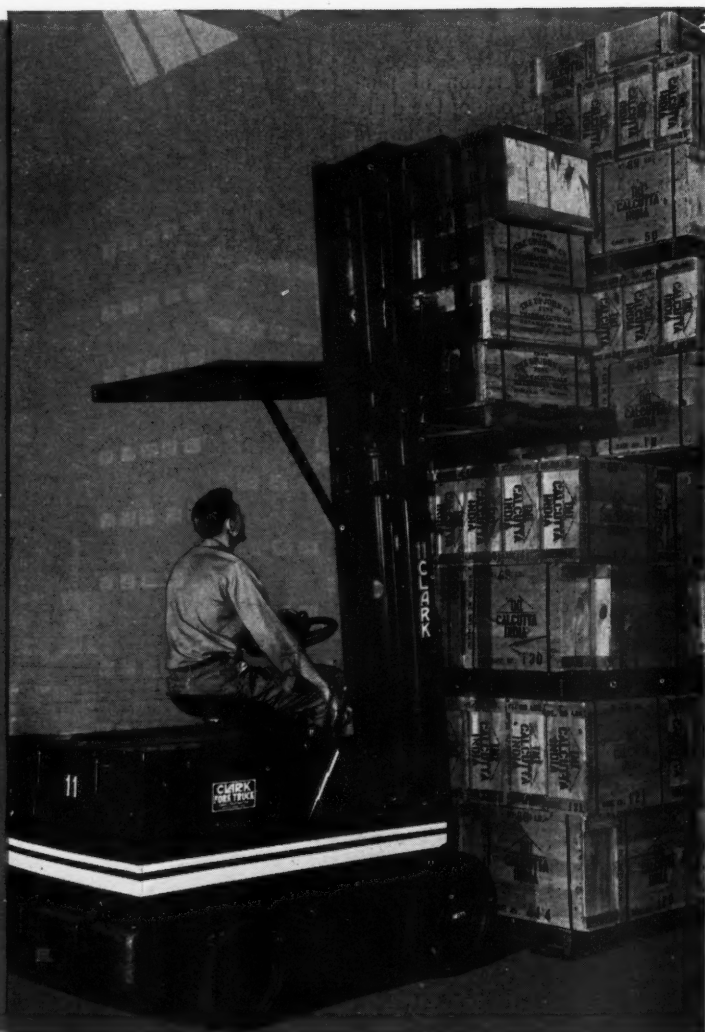
Name \_\_\_\_\_

Business Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

# C&D

*Third largest  
manufacturer  
of  
Industrial  
lead storage  
Batteries*



CLARK Elec-Carloader tiering cases for export.

**Specify**

**Aircool  
BATTERIES**

**with  
FOURFOLD  
INSULATION AND  
RETENTION**

1. Vertical Fibre Glass Retainer
2. Horizontal Fibre Glass Retainer
3. Perforated Hard Rubber Retainer
4. Microporous Rubber Separator



**C & D Batteries Inc., Conshohocken, Pa.—Building Better Batteries for more than 40 years**

HEAVY DUTY BATTERIES FOR ELECTRIC INDUSTRIAL TRUCKS • ELECTRIC LOCOMOTIVES • DIESEL LOCOMOTIVES  
AIR CONDITIONING AND CAR LIGHTING • TELEPHONE • MARINE • AUXILIARY POWER  
STARTING AND LIGHTING BATTERIES FOR MOTORCYCLES • AUTOMOBILES • TRUCKS • BUSES • INDUSTRIAL EQUIPMENT

# THE SECOND MATERIAL HANDLING SHOW

**T**HE Second Annual Material Handling Exposition is a thrilling memory. The importance of the industry is indicated by the fact that the Exposition, in its second year, was catapulted into the position of one of the leading industrial shows of America. Over 200,000 square feet of exhibit hall space were needed to display the wares of over 200 manufacturers of equipment. Visitor registration of more than 15,000 was recorded. The technical sessions at which outstanding material handling engineers gave papers drew record crowds of as many as 600 and 700 people. The motion picture theatre drew capacity crowds. The A.S.M.E. staged a physical demonstration of material handling practices in the arena of the Cleveland Public Auditorium before an audience of over 5,000 men.

These are the astounding figures which attest the growing awareness of American industry of the importance of proper material handling methods. Industrial men, confronted by numerous rising costs, came from all parts of the country, because they realized that in the proper use of material handling equipment and in the application of proper material handling methods lies their cost and profit salvation.

The Exposition was a true expression of the finest traditions of American competition. Manufacturers showed their wares in competition with each other, each company striving for perfection in their products in the true spirit of free enterprise. This is the American way of life in the best sense. All industry has benefited from this Exposition, and its effect will be felt for years to come in the increased production and the sizable savings made possible by the knowledge gained from visiting the show.

There will be another Exposition next year, in another part of the country, and the National Material Handling Exposition has thus become an established institution, just as material handling methods are recognized as being an integral part of good production practice for all industries. It is one of the chief components in the rise in the standard of living of the American laboring man. Material handling equipment permits man to do the work that he is best designed to do, and not to waste men by using them as burden bearers.

The annual Exposition will be a factor of far-reaching importance in emphasizing the benefits of modern handling methods to management, labor and the investor.

*Irving B. Hexter*

# WINNERS IN THE 1st *Flow* COST REDUCTION *Contest*



*The results of the first FLOW Cost Analysis Contest were most heartening inasmuch as they revealed the alertness of engineers and executives to the vital importance of "Knowing your costs." Prize-winning papers will be given next month and in subsequent issues.*

**W**INNERS in the 1947 FLOW Cost Reduction Contest, representing a wide variety of industries, are announced by Irving B. Hexter, publisher of FLOW.

First prize of \$500 will be divided between R. W. Belt and R. C. Rick, industrial engineers at American Greeting Publishers, Inc., Cleveland, who submitted a joint entry on the handling and packaging of greeting cards.

The second award of \$300 went to Charles H. Day, assistant to the general manager of Chicago operations, Sherwin-Williams Co., Chicago, for a discussion of warehouse handling operations in the paint industry.

Lewis D. Anderson, an assistant engineer for Resurrection Mining Co., Leadville, Colo., won the third prize of \$200 for his presentation on cost reduction in mining ore.

FIRST PRIZE WINNERS. R. C. Rick, shown at top, and R. W. Belt, below, were co-authors of a manuscript which won the \$500 award in the FLOW Cost Reduction Contest. Rick is production manager and Belt, industrial engineering manager, at American Greeting Publishers, Inc., Cleveland.

## Other Winners Listed

The \$100 awards for fourth to eighth place winners are as follows: Austin M. Elliott, industrial engineer for Lapp Insulator Co., Inc., LeRoy, N. Y., high voltage porcelain; George Nason Collins, field staff engineer, Drake, Startzman, Sheahan, Barclay, Inc., production control records and pneumatic tube systems; James E. Trask, Jr., division engineer, Minnesota Mining & Mfg. Co., St. Paul, Minn., coated abrasives; Walter Ewend, material handling engineer, The Budd Co., Detroit, Mich., automobile bodies, wheels, hubs, and drums; Joseph Thomas Castiglione, motions, methods, and time study engineer, Auburn Button Works, Inc., Auburn, N. Y., plastics.

All winners were notified by wire as soon as the judges had completed grading the entries, and checks were mailed.

Here are the points, in the order of their importance, on the basis of which the judges made the ratings. 1. Analysis of cost factors. 2. Technical accuracy. 3. Completeness of entry. 4. Evaluation of efficiency of new over old methods. Some excellent entries failed to



score because figures given were not sufficiently analyzed. Participants in the 1948 Contest (see page 51) should bear in mind that figures on savings should be substantiated, not given in a lump sum.

In commenting on the winning entry, the judges stated it was "the best presentation even though it is a small problem" and "a very good paper though the problem was simple and the saving relatively small."

#### Small Cost—Huge Savings

This entry showed that an investment of \$711 in material handling equipment saved \$2749 and 1787 miles of walking by employees annually. This and the other winning papers will be published in early issues of FLOW, beginning next month.

In contrast to small over-all savings of the first place winner, the runner-up dealing with warehousing operations in the paint and varnish industry showed cost reductions of \$288,000 per year. This sum represented more than 30 percent of the investment required.

Here are the winners of the first \$1500 FLOW Cost Reduction Contest!

**FIRST PRIZE:** R. W. Belt and R. C. Rick, Industrial Engineers, American Greeting Publishers, Inc., Cleveland, O.

**SECOND PRIZE:** Charles H. Day, Assistant to General Manager, Chicago Operations, Sherwin-Williams Co., Chicago, Ill.

**THIRD PRIZE:** Lewis D. Anderson, Assistant Engineer, Resurrection Mining Co., Leadville, Colo.

**FOURTH PRIZE:** Austin M. Elliott, Industrial Engineer, Lapp Insulator Co., Inc., LeRoy, N. Y.

**FIFTH PRIZE:** George Nason Collins, Field Staff Engineer, Drake, Startzman, Sheahan, Barclay, Inc., New York City.

**SIXTH PRIZE:** James E. Trask, Jr., Division Engineer, Minnesota Mining & Mfg. Co., St. Paul, Minn.

**SEVENTH PRIZE:** Walter Ewend, Material Handling Engineer, The Budd Co., Detroit, Mich.

**EIGHTH PRIZE:** Joseph Thomas Castiglione, Motions, Methods and Time Study Engineer, Auburn Button Works, Inc., Auburn, N. Y.

The third prize winning paper discussed how introduction of modern material handling equipment made possible profitable operations

in a mine faced with the problem of selling ore below cost to meet competition.

Other prize winning entries and non-prize winning manuscripts demonstrated tremendous inroads in costs effected in their respective plants through the modernization of material handling methods. The judges pointed out these could have earned higher ratings in the scoring if more details and data had been offered to substantiate the cost reduction and the method of arriving at the solution.

The judges were Randolph W. Mallick, Assistant to Director, Headquarters Manufacturing Engineering Department, Westinghouse Electric Corp., Pittsburgh; Richard Fell, Manager of Cost Accounting, National Screw and Mfg. Co., Cleveland, and James G. Witte, Manager of Merchandise Preparation Department, Montgomery Ward and Co., Chicago.

#### NEW CONTEST OPENS

A new \$1500 FLOW Cost Reduction Contest has been announced. See Page 51 for details.

SECOND PRIZE. Charles H. Day, assistant to the general manager, Sherwin-Williams Co., Chicago, won \$300.



THIRD PRIZE. Lewis D. Anderson, assistant engineer, Resurrection Mining Co., Leadville, Colo., winner of \$200.



# American Industry Rolls on **CASTERS** and **WHEELS**

## HOW TO SELECT THE RIGHT TYPE FOR THE JOB

*Millions of tons of material are moved in the nation's plants on wheeled and castered on-the-floor equipment. In certain operations, these devices are the material handling system. In others, this equipment performs supplementary functions which increase the efficiency of conveyor, industrial truck and crane operations. Caster and wheel applications thus increase flexibility of material handling operations and help make jobs easier to do.*

**B**ECAUSE mass production of consumer goods makes it necessary to move increasing quantities of raw materials, semi-finished and finished parts through the various stages of manufacture, there is a corresponding need for portability and mobility of carrying equipment. This need is prevalent in one-man operations as well as in giant plants employing thousands of men and women.

There are literally thousands of applications, many involving a high degree of ingenuity. Whatever the application in industry, wheeled and castered equipment is instrumental in maintaining a constant, efficient flow of production.

While casters and wheels, applied to floor-operated equipment, are probably among the most widely used material handling devices, misunderstandings at times result regarding the many types available and their specific uses. This discussion is presented to foster a better understanding of these universally used devices and to help readers make the proper selection for maximum efficiency in applications.

While it is true that simple wheels first provided mobility to industrial floor equipment, the need for maneuverability and greater

portability soon became apparent. This resulted in the development of a self-contained wheeled unit known as casters.

By including a wheel, axle and mounting frame within the single unit, casters could be easily applied to the many pieces of equipment in which portability and maneuverability were desired. This increased their popularity to the point where the overwhelming majority of floor trucks rolls on casters. The inference should not be drawn, however, that casters are replacing simple wheel and axle assemblies. In a great many applications, casters depend on wheels for their efficiency, and vice versa, one lending its advantages to the other for greater load capacity and/or maneuverability.

### Two Principal Types

Casters are available in two principal types—rigid and swivel. As the name implies, the rigid caster embodies a fixed mounting frame permitting movement in only two directions—forward and backward—much the same as a wheel and axle assembly.

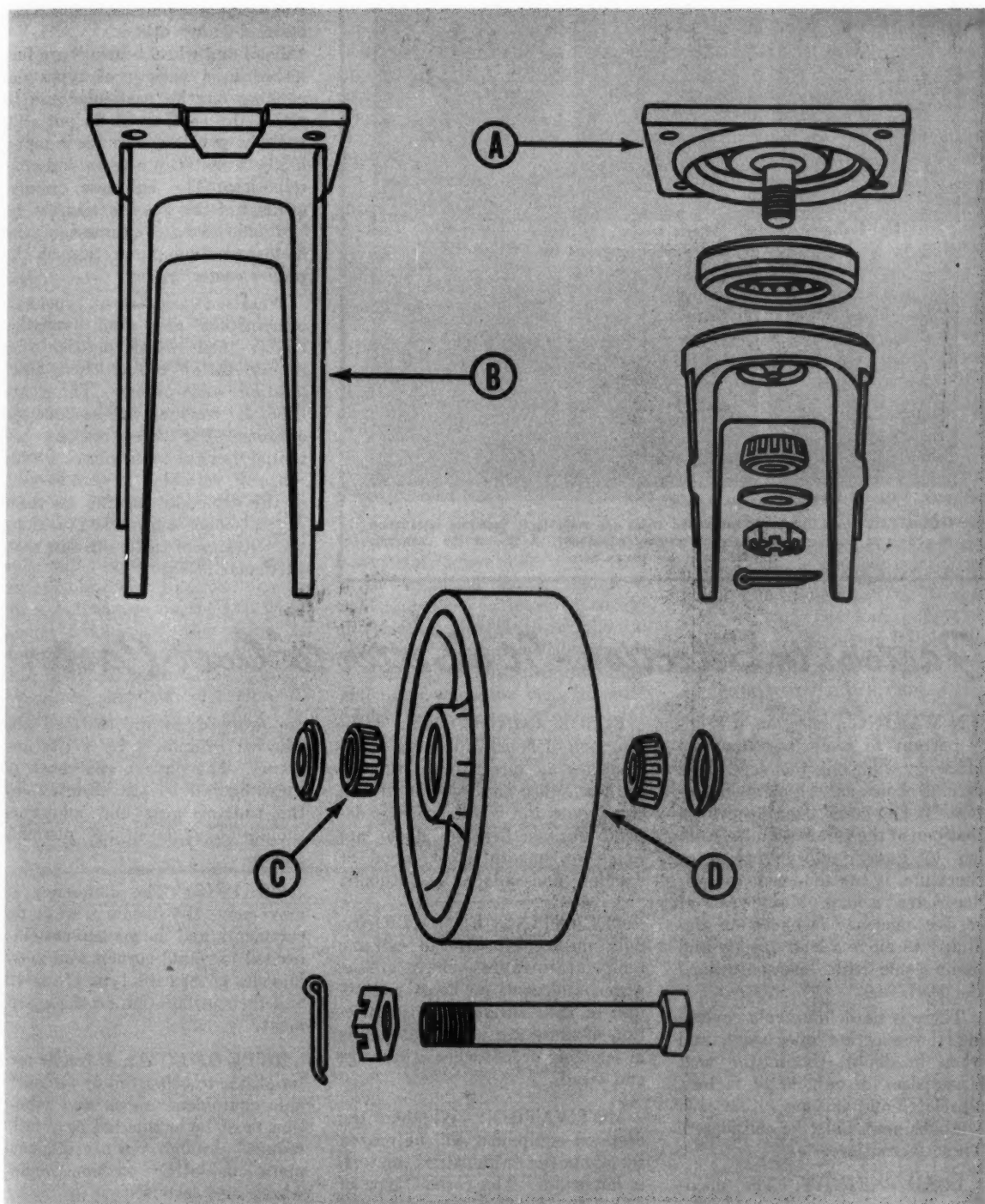
The swivel type has a mechanism made up of a number of accurately machined parts, whose mounting frame permits movement in all di-

rections. Because of its construction, the balance of this discussion will be devoted to swivel casters.

A caster in its simplest form consists of five principal parts, including: (1) mounting device; (2) king pin or bolt; (3) yoke or fork; (4) axle, and (5) a wheel. The wheel is installed between the legs of the fork or yoke by means of the axle bolt. This assembly of three parts is connected to the mounting device by means of the king bolt or pin through the apex of the yoke or fork. The king bolt thus becomes an axis on which the lower assembly rotates in a 360 degree arc and permits the caster to move in any direction.

Certain refinements and developments have been made in casters by the various manufacturers. Each improvement has been designed for a definite reason by the producers in attempting to provide a better caster from the standpoint of durability, capacity and service. Years of research have been spent on these developments.

In addition to improvements to the operating mechanism, manufacturers have incorporated refinements designed to facilitate direct installations on equipment of the user's particular design. As an example, a variety of mounting de-



**A** **SWIVEL CASTER.** Upper mechanism consists of mounting plate, load bearing, yoke or fork, and thrust bearing, held together by a king pin or bolt.

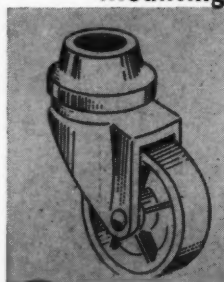
**B** **RIGID CASTER.** Upper structure is forged, stamped or assembled into a single non-swiveling unit including mounting device and fork.

**C** **WHEEL BEARINGS.** Several types of bearings, including roller, plain, needle, impregnated, ball, etc., can be specified.

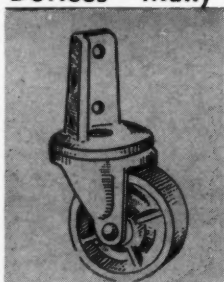
**D** **WHEELS.** A wide selection of materials and treads are available for the user depending on load, operating, floor and other requirements.



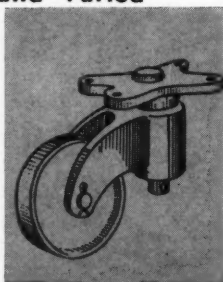
## Mounting Devices—Many and Varied



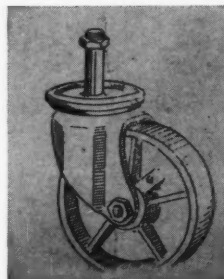
Pipe Socket



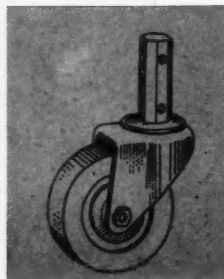
Angle Bracket



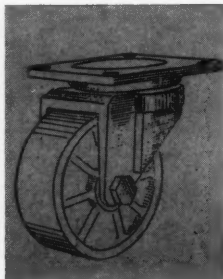
Socket Plate



Threaded Stem



Angle Stem



Swivel Plate

**MOUNTING DEVICES.** Many and varied styles are available to facilitate installation of casters to floor operated material handling equipment. A few of the commonly used styles are shown here.

vices includes flat plates, cone stems, stem plate, threaded pipe sockets, angle brackets, angle stems, threaded stems, angle sockets and many others.

Load and wheel bearings are furnished in a variety of types depending on the particular use to which the caster will be put.

Forks or yokes are made in many kinds of metal, processes and construction. The lightness or ruggedness of this construction can be best determined after examining the factors governing selection of the proper caster.

Wheels of various sizes, types and composition are also available, among them wood, plastic, solid rubber, metal, rubber tired, composition and others. There are types for track as well as floor operations. For these reasons, potential users of casters have a wide range of variables, as can be seen in the exploded drawing on these pages, to choose from when making the selection of casters to suit their particular needs.

## Factors in Selection - It's Better to "Over-Caster"

**I**N MAKING a selection, it is important to remember that top efficiency and long life depend on careful choice as well as good casters. It has been generally proven that one of the greatest faults, leading to unsatisfactory service or short life, is the tendency to "under-caster" a load. Many years of service efficiency in operation and ability to move a load quickly and easily come with "over-castering" the load.

There is no definite rule governing the selection of casters, and when in doubt, choose the next larger size. A number of factors, all related and varying within each establishment, must be considered. These factors are:

**LOAD WEIGHT:** The maximum load to be carried must be determined before a caster of proper capacity can be picked. The greater the load, the greater the necessity for antifriction bearings and hardened raceways. Load ratings of each type of caster should be studied.

**FLOOR CONDITIONS:** Construction of floors influences caster efficiency in direct proportion to the load. Size and style of wheels, tread type and wheel bearings depend on whether the floors are rough or smooth, steel, wood or concrete and indoors or outdoors.

**OPERATING CONDITIONS:** Sills, ramps, exposure to extreme temperature ranges, chips, grease, water, and acids on floors, protection of floor surfaces, and restriction of noise are important points in selecting proper wheels, bearings and tread.

**MOTIVATION:** Whether the castered equipment will be moved by manpower or industrial tractors, is important. The correct type of wheel for the floor conditions and power source will reduce the time required for movement of loads. Consideration must be given to crane handling. In some plants, loaded mobile equipment is moved from department to department through the air. In others, loads

are dropped on the castered and wheeled equipment by hoists and cranes. The impact and shock of these operations are absorbed by the running gear and allowance should be made in the planning stages.

**TRAFFIC:** The frequency of movement, the distance, what departments, and the maneuverability needed to round corners and move in aisles govern the type of casters and their installation on the equipment.

**TYPE OF LOAD:** If fragile materials are to be moved by the portable equipment, shock and vibration must be eliminated or greatly reduced through the use of pneumatic or other cushion-treaded wheels and casters.

**SPECIAL PROBLEMS:** Certain types of industries such as textile plants, garment works and others, will require thread guards on casters for efficient operations. These and other problems must be given serious consideration.



# Applications and Installation Patterns

**E**FFICIENCY of many industrial vehicles, equipped with the proper size and capacity casters and wheels, may often be seriously impaired because of improper application of the rolling equipment.

There are right and wrong ways of installing the load carriers, depending on the use intended for the floor equipment. A number of the most commonly used combinations of wheels, rigid and swiveling casters are illustrated on these pages.

Some of the vital factors to remember in applying casters include the load the vehicle is to carry, distances to be traveled and frequency, width of aisles and corners, and degree of maneuverability required.

Balance-type installations on platform trucks are preferred in many industries, including lumber mills and yards, steel plants, tube mills and others where long loads are encountered. The load on the truck is balanced on the two large wheels mounted in the center of the platform during movement, thus reducing friction.

Casters, installed at each end, facilitate maneuvering of the truck and maintain a level keel when the truck is idle.

Large load wheels on permanent

axles are also used on some floor trucks with axles mounted at one end and casters at the opposite end. It is agreed by most material handling engineers that use of load wheels should be limited to floor

ing when the equipment is being towed in aisles. In other words, rigid casters or axle-mounted wheels maintain movement in a straight course while swivel types facilitate turning.

Thus, from an application or operating standpoint, the main factors to bear in mind in making a selection are: 1. Load weight. 2. Floor conditions. 3. Operating conditions. 4. Method of propulsion. 5. Traffic conditions, or frequency of movement. In the long run, it is better to "over-caster"—that is, to select the next larger size in order to keep loads rolling for ease, economy of power, efficiency and longer life.

\* \* \*

## ACKNOWLEDGMENT

FLOW acknowledges the information, charts, data and suggestions provided in connection with this article and the succeeding articles on Floor Trucks by the following: The Bassick Co., Divine Brothers Co., The Fairbanks Co., Colson Corp., American Pulley Co., Service Caster and Truck Division of Domestic Industries, Inc., Thomas Truck and Caster Co., Hamilton Caster and Truck Co., Faultless Caster Corp., Nutting Truck and Caster Co., Palmer-Shile Co., Hutton Wheel Corp. and Electric Wheel Co.

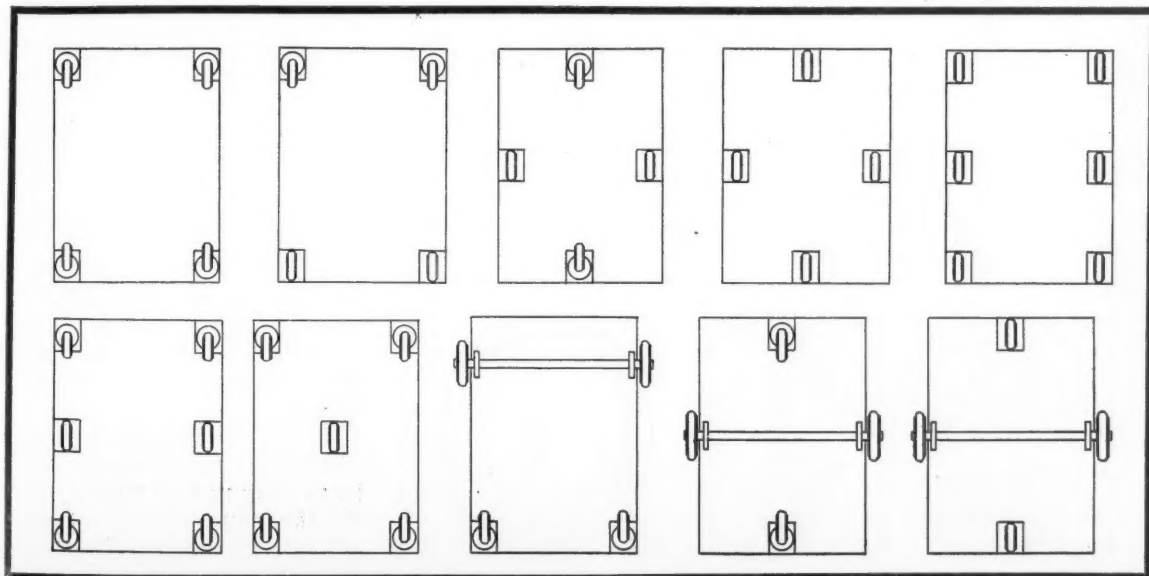
## WHEELS

**W**HEELS are produced in a variety of materials for specific purposes, including metals and alloys, wood, canvas, rubber and other types of composition. Some are intended for use in definite installation patterns. The different kinds of wheels are discussed and illustrated in a special section of this issue, beginning on Page 26.

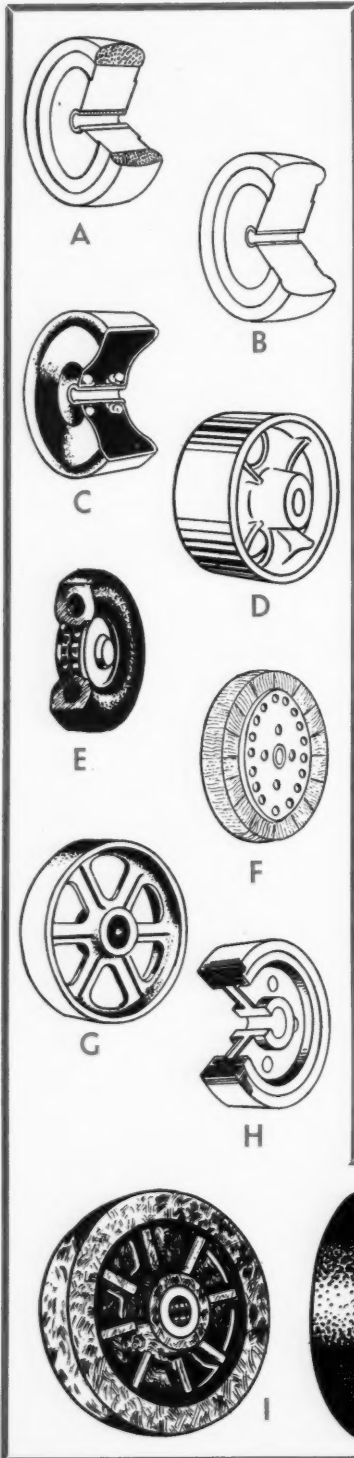
equipment normally subjected to heavy duty operations.

An all-swivel caster equipped vehicle can be maneuvered within the smallest area. However, the use of all swivel casters is not recommended by many manufacturers and users when the vehicles must travel long distances. Applications engineers recommend using rigid and swivel caster combinations to lend stability and eliminate sway-

**APPLICATION PATTERNS.** Most frequently used patterns of applying swivel and rigid casters and wheels, alone or in combination, are illustrated in this chart.



# WHEELS—and their variations



- A** **SOFT RUBBER** tread vulcanized on hard composition core; operate quietly, protect floors; load limit approximately 500 pounds.
- B** **HARD RUBBER** on fiber composition tread and core; protect floors; non-sparking; capacities comparable to semi-steel wheels.
- C** **PRESSED STEEL** wheels formed by welding molded discs; resist shocks of rough roads; load capacity of approximately 2000 pounds.
- D** **STEEL and SEMI-STEEL:** Forged or cast in various grades of steel; capacities up to 10,000 pounds depending on requirements.
- E** **SEMI-PNEUMATIC:** Hollowed center rubber treads, also known as cushion tires; suitable for light duty; protect loads against shock.
- F** **WOOD** wheels are constructed of hardwood wedges held together by two steel plates; non-sparking, floor protection; easy rolling.
- G** **ALUMINUM** alloy wheels supplied with metal or rubber treads; reduce dead weight of equipment; sparkproof; capacity, one ton.
- H** **CANVAS** tread consists of end canvas assembled in blocks and set radially on rim; shock resistant, noiseless, oil resistant.
- I** **PLASTIC** wheels are molded from macerated solids impregnated with phenolic resins; non-sparking, acid resistant, easy rolling.
- J** **SOLID RUBBER** tired steel wheels available with molded-on and demountable tread; protect floors, noiseless, capacity, 1500 pounds.
- K** **SOLID RUBBER** tired wheels inserted between two heavy gage steel discs which are bolted together to form the wheels.

(Editor's Note: Load limits are approximate and may be lesser or greater according to the quality.)

**S** **LECTION** of a correct type of wheel is equally as important as choosing the right caster. Primary consideration must be given to the factors involving load weight, floor conditions, and operating conditions discussed in the preceding section.

Maximum load must be determined in the first place. After the heaviest weight which will be carried on the floor-operated equipment is learned, the minimum for size of wheel can be established if metal wheels are to be used. However, for efficient operations, the two other factors must be considered.

Floor conditions must be respected. Rough floors will require a larger wheel which will ride over the obstructions with ease. Wide faced wheels are more efficient on rough or soft floors than wheels with narrow treads. In addition, it should be remembered that the larger the wheel the easier the equipment will roll and thus require less draw bar pull. Unless it is necessary to use small diameter wheels for clearance of head room, selection of a wheel at least one size above the minimum requirements will pay dividends in longer life of the caster, satisfactory service, faster movement of loads and increased safety.

Operating conditions will dictate the kind of wheel and type of tread which may be used.

Floors on which chips and metal scraps are encountered usually require metal wheels because fabricated tread would be quickly damaged by continued use under such conditions. The same can be said about broken or rough surfaced floors.

On the other hand, floors on which acids collect may be harmful to many types of metal wheels. For this purpose, wheels of some acid-resistant composition should be selected.

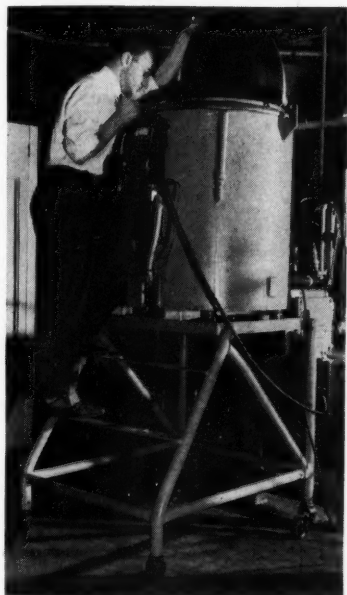
Wheels of certain materials may be found to operate on wood block, concrete, or board floors with more efficiency than specific metal wheels.

Several manufacturers offer composition wheels which they claim have the same carrying capacity as metal wheels of the same size. This point is important when floors must be protected or noise minimized.

Most authorities agree that soft rubber tread wheels afford the best protection to floors with the quietest operation. Gain of these two points, protection and silence, however, brings a loss in load capacity since the soft rubber tread cannot be expected to carry as much weight as hard rubber, composition or metal wheels.

In addition, consideration must

**PIPESTEM SWIVEL CASTERS** provide the mobility and maneuverability required in tank stands, as shown above, used at Strong Cobb and Co.,



Cleveland. The electrically heated tanks, holding 50 gallons of semi-liquid substances such as tooth paste during tube filling operations, are placed on the mobile stands by an overhead hoist sling connected to lugs on the sides. High enough to permit gravity flow of materials, the tank can be easily moved to the filling machine and connected. Rubber treads on the caster wheels bring protection to floors and noiseless movement.

**BEARINGS** for Casters and Wheels are described on the next two pages.

#### CASTERED TRAILER CARRIES 120 IMPLEMENT TIRES

**A**T least two handlings of implement tires have been eliminated through the use of mobile storage racks at International Harvester Co. The tires are loaded in the racks upon delivery and are not handled again until they are installed on a finished product. The trailer, built to efficiently handle 120 tires in its 12-sectioned rack, is equipped with four swivel and two rigid casters. The swivel casters are installed at the front and center to facilitate turning set.



a small area. The pair of rigid casters at the rear end keep the trailer from swaying during transportation.

Plant executives pointed out several advantages of the mobile racks. After the tires are loaded on the racks at the delivery dock, they are removed to temporary storage until needed on the assembly lines. Two handlings—unloading in storage and reloading for transfer to assembly—are eliminated. Inventory is facilitated by the use of the racks. The three tiers are divided into 12 sections, each holding 10 tires. In addition, storage in the racks eliminates the possibility of damage to the tires since each row is individually supported to eliminate crushing. There is no danger of falling stacks of tires.—Courtesy International Harvester Co., East Moline Works.

be given the length of time a heavily loaded piece of equipment will be permitted to stand in "dead storage". While short periods of standing in one place may not cause discernable damage to the rolling surface, lengthy "stands" may cause changes in the circle in certain types of non-metallic treads or wheels.

Consideration must also be given to the type of manufacturing process in which the equipment will be used. Use of steel and certain other types of metal wheels, which might create a mechanical spark when striking or brushing against another metal object, would be dangerous in plants producing explosives. In the same way, static electric sparks may be a hazard where volatile fumes are permitted to collect.

The method of propulsion, manual or motor, is likewise among the deciding factors. As pointed out elsewhere in this discussion, larger wheels roll easily, thus reducing fatigue and facilitating movement

of loads.

Just as in the selection of the complete caster, economy and efficiency virtually dictate an allowance of a margin of safety above the estimated maximum load.

**FULL-SWIVELING CASTERS** facilitate the safe movement of crated glass at the Hooker Glass and Paint Mfg. Co., Chicago. Adjustable stub forks on the castered handling devices are slipped under each end of the heavy



crates. Containers are stabilized with top clamps. By means of hydraulic jacks in the equipment, the containers are lifted off the floor and easily and quickly moved through the plant. The crates are lowered at a controlled speed.—Courtesy, Skarnes Engineering & Supply Co.

Here Are the Variations in

# WHEEL BEARINGS

*They Make the Job Easy*

**P**OWER, physical or mechanical, can be conserved by the careful selection of the type of bearings for running gear of mobile equipment. This is equally true for caster wheels and load wheels.

Bearings in wheels and casters do not increase the load capacity. They give easier starting and easier rolling to the floor equipment when correctly applied and properly lubricated. They are, therefore, savers of power.

Every manufacturer of casters and wheels has devoted many years to the study of bearings for his particular product. Each line is generally presented with a standard

selection of bearings but, in most cases, the user may obtain bearings of his choice by special order.

Bearings are used to reduce friction in at least two places in all industrial casters. The most general application of bearings is between the mounting plate, or other mounting device, and the shoulders of the fork. These are known as load bearings and at least three different types—ball, roller and tapered—are commonly applied. Use of a particular type depends on the load duty planned for the caster.

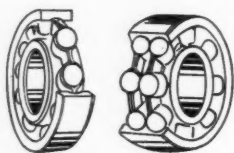
Application of a second bearing in the upper caster assembly is also

fairly common in industrial bearings. This bearing is installed below the load bearing and between the yoke and king bolt. It is known as the thrust bearing and is designed to absorb secondary shock and promote easier swiveling under load conditions. This is vital to handling especially in confined areas.

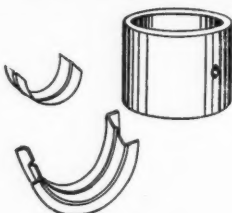
Special types of ball bearings, two-level or double ball race type, installed in the upper caster, are designed to give easier swiveling than single raceway casters.

## Bearings for Wheels

A variety of wheel bearings is



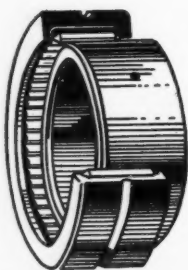
**BALL BEARINGS:** Available in single and double row types; suitable for light to medium loads; excel in high speed work.



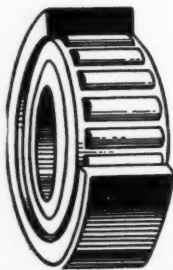
**BABBITT BEARINGS** are made of various metal compositions and usually contain a large amount of tin, either split or solid.



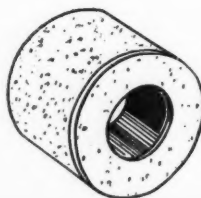
**BRONZE BEARINGS:** Cast or pressed compositions can be had in solid or split types; handle heavy loads; withstand shock.



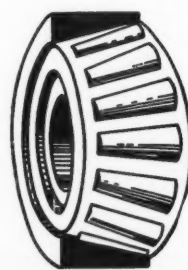
**NEEDLE BEARING:** Equipped with small diameter rollers; replace bushings in high speed operations; small size has advantages.



**ROLLER BEARINGS:** Compensate for shaft expansion and deflection; capable of handling heavy loads.



**SELF LUBRICATING:** Valuable where oiling is impractical; produced from powdered metals impregnated with lubricating material.



**TAPER ROLLER BEARING:** Suited for light or heavy radial or thrust loads; provide for adjustment for wear.



available to users. Their selection in most instances may be according to the user's preference. However, there are types of bearings which should not be picked if the equipment is intended for operation under certain conditions. In order to help the user avoid these pitfalls, the various types of bearings and their advantages will be discussed.

Standard commercial roller bearings with split outer sleeve and end washers are commonly furnished by wheel and caster manufacturers because they operate with a high degree of efficiency under virtually any conditions.

Combination roller and ball bearings are provided by some manufacturers in certain types of composition wheels, thus utilizing the line distribution of load on the rollers and anti-friction quality of the balls.

Needle type roller bearings are used in many types of semi-steel wheels designed for carrying heavy loads in low clearance areas.

Tapered roller bearings can be used in many types of precision

casters and certain types of wheels designed for heavy duty.

Oil-impregnated bearings are used by many manufacturers for caster wheels, especially in the composition types. These bearings are compounded of powdered metal and saturated with oil. Pressure of the axle against the bearing forces a thin film of the lubricant to coat the surfaces, thus providing self-lubrication. Impregnated bearings are recommended for use on equipment operating under extremely hot conditions, where lubricants in other bearings would bleed, and moist areas, where rusting might occur. However, they should be avoided if high speed operation is the practice.

It can be seen from the foregoing that the selection of the correct types of bearings for wheels and casters is important to more efficient handling of materials within the plant. Manufacturers' representatives, given the factors under which the equipment is to operate, will recommend bearings which will give long and satisfactory service.

**M**ANY in-plant handling devices are used by the Brightman Nut and Manufacturing Company, Sandusky, Ohio, to meet specific requirements.



One of these, a portable, revolving hand crane, lifts and moves heavy dies, machine parts and other heavy equipment. It has a 360-degree swing, a six-foot over-all height, and travels on a swivel caster base. The capacity of the unit is 350 pounds and it is said to hold any desired height within its capacity. The crane is hand operated.

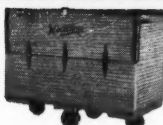
## Is your Materials Handling **ACCIDENTAL** or **ENGINEERED** ?



**Dolly & Flat Trucks**  
Low Platforms



**Two Wheel Trucks**



**Box and Four Sided Trucks**



**Three Sided Superstructure**



**Shelf Trucks**



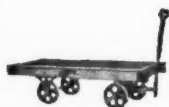
**Non-Tilting Platform Trucks**



**Balance Type Stake Trucks**



**Balance Type Rack Trucks**



**Wagon Type Trucks**



**Trailer Trucks**



**Truck Casters and Parts**



**Rubber Tired and Metal Wheels**

# Nutting

**Makes Over 1000 Standard and Special Truck Designs for Every Purpose**

In many businesses, the handling of materials has grown on a "hap-hazard" basis, as the business has grown. If this is true in your case, you will be surprised at how much your whole production program can be speeded up—and your handling costs reduced—by a properly engineered materials handling system and selection of trucks exactly suited to each type of work. More than 1,000 truck designs have been developed in the Nutting line because they were needed.

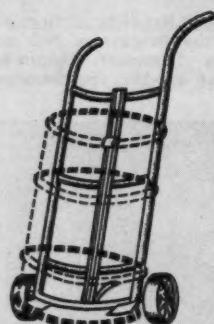
**CALL IN A NUTTING SALES ENGINEER**—let him, backed by the Nutting factory, help you select the right truck for each job. Consult the classified section of your phone directory, or write us direct.

## NUTTING TRUCK & CASTER COMPANY

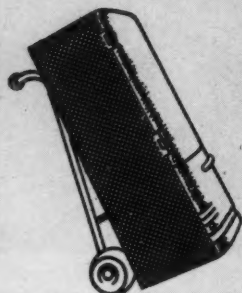
1602 DIVISION STREET WEST, FARIBAULT, MINNESOTA

our  
**57<sup>th</sup> Year**

# CHOOSE THE RIGHT FLOOR TRUCK



Drum Handling Truck



Refrigerator Truck



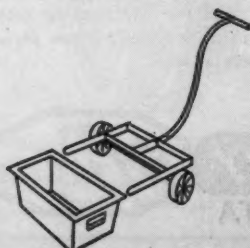
Warehouse Truck



Hopper Truck



Single Handle Truck



Finger Truck

THE STEADY increase and refinements in design have given floor trucks a tremendous flexibility for use in all types of operations. In fact, the methods of applying casters, wheels and design changes are beyond physical limits of listing here. The representative models featured in this presentation are merely suggestive of the many types available for moving products with greatest economy of effort and cost.

For virtually every operation involving the movement of materials—whether light, medium or heavy in weight—there is a method of doing it safely and easily by use of floor trucks where such equipment is indicated. This is true of the smallest and simplest types of such equipment as well as of the largest and complex designs.

## Variations in Two-Wheel Hand Trucks

The two-wheel hand truck, familiar wherever the wheels of industry and commerce are turning, carries a load on a frame supported by wheels at the bottom and handles at the upper end.

This basic hand truck has been modified and developed until today there is a specially designed type to facilitate the handling of almost any material or container suited for its capacity. This has been accomplished by designing variations in the axle, nose, frame and handles. Several types of axles are available, varying according to the weight and characteristics of the intended load. Some sections of the

country and industry prefer longer axles and wheels mounted outside the frame, while others prefer shorter axles with wheels located inside the frame. The same can be said about straight or curved handles.

The types of wheels, their diameter and tread, are dependent in most cases on whether they will be mounted inside or outside the frame, and the intended use of the hand truck. Factors to be considered in their selection are discussed in detail in the article on casters and wheels. A factor worth repeating here is that the larger the wheel, the easier the roll.

Noses of hand trucks can differ almost as greatly as the uses to which they are put. The more common types are shovel, closed, open, chisel, platform and flange. Each type of nose was developed as a result of wide research to suit the most common use for the truck. For example, a type with a shovel nose and a curved frame is designed for handling such cylindrical objects as rolls of floor covering. Similarly, a chisel type is available for large bulky packages light in weight, a hopper type for sand, cinders and other bulk materials, a drum type for manipulating heavy 55-gal. drums. Included are such specialized models as refrigerator trucks equipped with pneumatic tires and canvas holders, designed for safely moving refrigerators, radios and similar bulky objects vulnerable to damage. This sample enumeration is brief in comparison with the types available for handling specific types of goods easily

# CK FOR YOUR JOB...

*At one time or another most materials are moved on casters and/or wheeled floor trucks. Like any other material handling equipment, these manually operated trucks have undergone constant changes over the years in order to adapt them to specific purposes and types of materials. This review of widely used types of two-wheel and platform floor trucks is designed to familiarize readers with the vast variety of models available for general and special uses.*

and safely. A number of available designs are illustrated in these columns.

The frame is likewise produced in a vast range of styles. Special frames are provided with single or double handles and, like the nose, are designed for the safe and easy manipulation of crates, bags, cartons, carboys, tote boxes, furniture, paper rolls, gas cylinders and other bulky or awkward units. Several of these types are shown here.

Frames come in wood or tubular metal construction, with one or more horizontal and/or vertical straps for supporting the load. In more recent times, light-weight metals and alloys have also been increasingly used in their construction. The purpose of construction and design changes has been to give the greatest possible load capacity with the lowest possible truck weight, consistent with safe practice.

From the foregoing, one conclusion becomes evident; for most efficient and economical operation, hand truck equipment should be as carefully considered and chosen as any other type of material handling equipment. Consult your supplier on the best model for the job.

## Platform Trucks

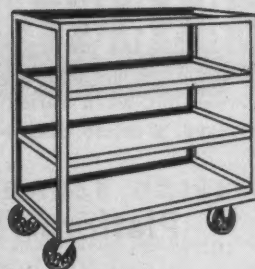
What has been said about the flexibility of two wheel hand trucks

applies with equal force to platform trucks, whose running gear includes three, four, six or more casters and/or wheels. Platform trucks offer the user variations in at least three principal parts: 1. Running gear. 2. Deck or platform. 3. Superstructure.

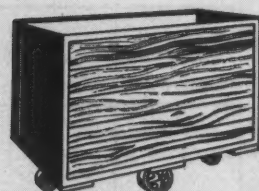
In selecting a floor truck, either a standard or special model, the user should survey his operations to determine the specific or most frequent service for which the vehicle is intended to be used.

While two-wheel trucks are maneuverable in practically any quarters, the larger platform types must necessarily be chosen in conformity with aisle widths, extent of working areas, and maneuverability. Other points to be considered are (1) floor conditions, (2) type, weight, and size of material to be moved, (3) where used, and (4) manner of loading, whether manually or by other means. If, for example, heavy loads are to be dropped by a crane or hoist, the effect of the shock must be taken into consideration. Thus the type of superstructure as well as bed will be largely determined by these and other factors. *(In this connection see also the factors in selection given in the article on wheels and casters, this issue.—Ed.)*

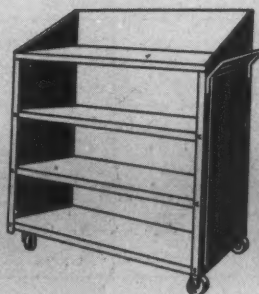
In many plants, engineers will select a heavy-duty model to serve the needs of a certain department,



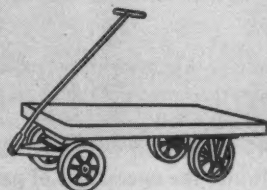
Shelf Truck



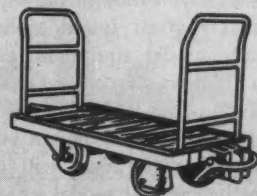
Box Truck



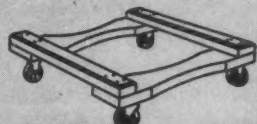
Order Picking Truck



Wagon-Type Truck



Trailer-Type Truck



Dolly-Type Truck



and a lighter type for another operation where relatively light loads are moved. The purpose is to standardize, as mentioned earlier, on the basis of the most frequent service; but when varied uses are involved, greatest efficiency is ob-

selection available.

Styles and types of superstructures run into the thousands. Special superstructures designed to perform particular functions can be mounted on virtually any of the platforms or other rolling equip-

the load to be carried. Commonly used installation patterns are shown in the article on wheels and casters.

The conclusion drawn regarding two-wheel hand trucks applies equally to platform trucks. It

## Platform Truck Superstructures Are Flexible Fixtures

	ONE END CLOSED	RACK IN CENTER	TWO ENDS CLOSED	TWO SIDES CLOSED	SIDE AND END CLOSED	SIDE AND ENDS CLOSED	SIDES AND END CLOSED	SIDES AND ENDS CLOSED
FLAT IRON WITH STRAPS								
FLAT IRON WITH RODS								
ROUND IRON AND PIPE								
SOLID METAL SHEET IRON ETC.								
WOODEN STAKES								
WOODEN SLATS								
SOLID WOOD								

tained by providing models best suited to various requirements.

Manufacturers offer a wide variety of standard type trucks which fit into the operations of practically all industries. Revisions can often be made easily to fill a particular need. A variation in the superstructure is often found sufficient to make similar equipment adaptable to different purposes. On the other hand, a high-bed truck used around machines for convenient loading or unloading purposes will probably not be the best model where a low-bed type is indicated for transporting fairly bulky and heavy loads for which a low center of gravity is desirable. The types illustrated on these pages are offered merely to give an idea of the greatly larger

**SUPERSTRUCTURES** of pipe, stakes, fiber board, band iron, etc., can be arranged to suit each particular need.

ment.

The flexibility of this type of equipment is extended by the fact that many manufacturers are in a position to furnish special models to meet particular requirements in regard to running gear, platforms, and superstructures.

Manufacturers usually recommend the selection of the deck or platform as the first step. After this has been determined, the user should decide on the type of running gear. For platform trucks, this choice ranges from two wheels installed at one end (in the case of semi-live skids) to almost any number, depending on the use and

should be remembered that bacon and bricks, castings and china, textiles and taffy may require a specific vehicle for maximum efficiency in operation. Inadequate service and needless effort result from a piece of floor equipment purchased because "Jones is using one like it".

### Trailers and Wagons

Trailers and wagon trucks are another group in the general classification of manually operated floor trucks. Trailers, as their name implies, are usually drawn behind some type of power unit, as distinguished from the units propelled by manpower.

Trailers are usually designed for carrying heavy loads over long distances. They are equipped with



hitches for hooking on to tractors or fork trucks, as well as other trailers, in trains for the mass movement of material. Trailer hitches are available in manual and automatic types. The factors governing selection are much like those given for platform trucks. In certain order picking operations the lighter types of trailers are often used temporarily as hand trucks on short moves.

The tractor-train method is used extensively in warehouses, LCL houses, marine and rail terminals, large manufacturing plants and in many other installations. Wagon and trailer trucks are widely employed in such industries as steel mills, foundries, hardware houses, machine shops, and a variety of manufacturing and processing plants. Their wide range of load capacities makes them adaptable to all industrial requirements.

For easy maneuverability, trailers come with various patterns of running gear. The most frequently used patterns provide two load wheels at the rear for stability in movement and two swivel-type casters at the front, also two front wheels on an axle mounted on a fifth wheel. Special types have two fifth wheel installations, front and rear.

The utmost flexibility in operation is assured by the fact that trailers and wagons can be equipped with virtually any type of wheel or tread to suit the purpose, location and floor condition.

Wagon and trailer trucks can be obtained with hardwood or steel decks, solid or slatted. The superstructures have a range as extensive as that of manually propelled platform trucks. Most wagon trucks are equipped with long handles for manual towing between operations. Certain types (steel buggies, for example) have a yoke and eye device for hooking onto the hitch of a tractor.

#### **Dollies and Special Types**

Portability, flexibility and maneuverability of wheel and caster equipment are again illustrated in

# *The* **LOAD DISPATCHER**

## **A REMARKABLE TRUCK**

## **AT A REMARKABLE PRICE**

The Load Dispatcher is adaptable to hundreds of material handling jobs around factories, foundries, warehouses, wharves, freight houses, etc., and will save time and money because of its unusually rapid and convenient handling. Its maneuverability and the ease of it amazes everyone who sees it for the first time. Nothing excels the Load Dispatcher for getting around where the going is tight. Its utter simplicity of design assures that it will require the very minimum of "time out" for attention and maintenance. From first cost on through its daily operation—fuel, labor, speed, maintenance—you will find that it contributes in full measure to economy of operation.



Load Dispatcher in a fertilizer factory with unusually cramped quarters for loading and transporting. Four men are now doing the work of 16 men formerly required with hand trucks. Net load shown—2400 pounds.

You will be interested in the many unique, practical features of the Load Dispatcher. Write for catalog. Some valuable territories open for distributors who can qualify.

**PRICED FROM**

**\$465**

F. O. B. INDIANAPOLIS

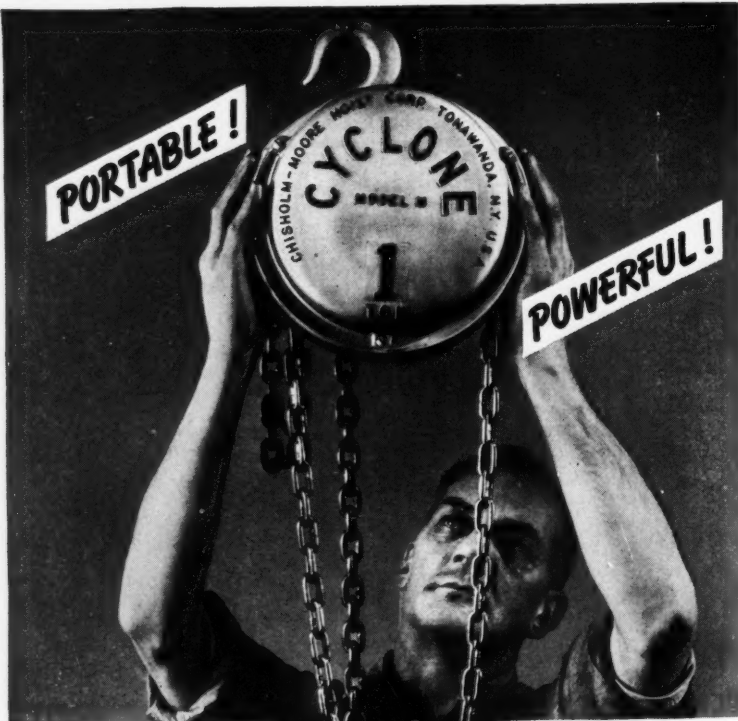
**SCHWITZER-CUMMINS COMPANY**

*Material Handling Truck Division*

1145 EAST 22ND STREET • INDIANAPOLIS 7, U. S. A.

# NEW! CM CYCLONE

Model M • HEAVY DUTY HIGH SPEED HOIST • Capacities from 1/4 ton up



## 96% EFFICIENCY

conserves worker energy and increases productivity

## 42% FEWER PARTS

simplifies maintenance

## 63% LESS WEIGHT

- 1 ton weighs 35 lbs.
- 2 ton weighs 59 lbs.
- 3 ton weighs 90 lbs.

**Plus SEALED-IN LIFETIME LUBRICATION**  
prolongs life...reduces wear

**Plus HERC-ALLOY**  
America's First and Safest  
Steel Load Chain

The CM Cyclone Model M, constructed of today's stronger alloys of steel and Alcoa Aluminum, is years ahead as a production and maintenance tool. New type load brake with smooth, positive control aids in spotting and assembly work. Thousands of these extra value hoists are already in service, daily demonstrating their superior performance.

Ask your distributor to show you the new Cyclone Model M Hoist

# CHISHOLM-MOORE

## HOIST CORPORATION

(Affiliated with Columbus McKinnon Chain Corporation)

GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.

SALES OFFICES: New York • Chicago • Cleveland • San Francisco • Los Angeles

dollies and literally scores of special-purpose types of dolly-trucks.

The open-frame type of a dolly is light in weight in comparison with the load it carries. It is most frequently used to provide mobility on short moves to some cumbersome load. In operation, one end or side is frequently tilted to load or unload the unit. Like platform trucks, dollies are frequently used in conjunction with such power equipment as fork trucks and cranes.

The running gears for dollies range from a single wide roller, mounted across the center of the frame, to as many as six (and more) casters and wheels installed in one of the application patterns referred to earlier.

Frames supporting the loads have been given certain characteristics by manufacturers in order to suit the unit to the load. Examples are pallet dollies, those for paper rolls, large tanks, heavy machinery, etc. Another group includes those with angle iron frames for supporting cases in dairies, cartons of various kinds, cans or drums, hogsheads, casks, rolls, pianos, furniture and many other loads used in repetitive operations.

This description emphasizes a point frequently overlooked—namely, the importance of manually propelled equipment in moving the goods in American industry. Its importance is, perhaps, at times not fully appreciated for the simple reason it is so widely used that it is taken for granted. A further significant point is that, just as in the case of other material handling equipment, two-wheel and platform floor trucks should be carefully chosen for the job they are intended to perform. Only in this way can you take full advantage of the tremendous flexibility offered by this equipment.

### FOR THE BENEFIT OF THE THOUSANDS

who could not attend the technical sessions of the second Material Handling Exposition we are presenting a digest of the papers given in this and subsequent issues. See opposite page.

## Determining Pallet Sizes

By W. BURL DALTON, SR.  
General Operations Manager  
Kraft Foods Co., Chicago

**O**UR products are packed in various types, sizes and shapes of containers such as the usual fibreboard cartons; metal, fibreboard and wooden containers of cylindrical design; bags of cloth and paper construction, a variety of barrels, drums and wooden boxes. A palletization program geared and coordinated to an operation of this extent, requires numerous tailor-made applications.

We have, and will continue to experiment with the so-called expendable fibreboard pallet, but the use of such a pallet in our coolers, refrigerator cars and trucks presents problems for us which might not prove important in a one hundred percent handling of dry freight. The pallet industry, however, is in its infancy and I am of the firm belief that the next few years will develop much in the way of new types, construction and design of pallets.

The factors that must be considered in determining the size of pallets can be grouped into three general classifications:

- I. Nature and Character of the Commodities to be Palletized.
- II. Nature and Extent of the Operations.
- III. Physical Limitations Imposed by Existing Plant Properties.

I should like to discuss briefly the more important factors coming under each of these headings.

### I. NATURE AND CHARACTER OF THE COMMODITIES TO BE PALLETIZED.

- (a) On what size pallet do the shapes and sizes of the products or containers in which they are packed lend themselves toward unit loading?
- (b) Is the container, or the carton, of sufficient strength to withstand the number of superimposed pallet loads necessary for economical handling and maximum utilization of storage space?

Unless you are certain about these factors, laboratory tests are suggested as the most positive method of eliminating costly mistakes with the usually attendant headaches and grief.

- (c) Insofar as the product container or shipping carton is concerned, what is the limiting factor as to stacking height?
- (d) How about the cube and the weight density? Is the latter such that minimum carload or truckload weights can be loaded in a car or truck if transportation is to be an integral part of your operation?
- (e) Is the preponderance of shipping containers rectangular in shape, or are many of them square? Square containers present problems with respect to stability and height of load.
- (f) If there are comparatively few physical restrictions as to the

(Turn to page 68)

**TRAVELING HOISTS WORK BETTER**  
*When Fed Power by the New Type "YS"*

## APPLETON REELITE



**Automatically Takes Up,  
Pays Out Conductor Cable**  
**No Exposed Current Collectors, Trolleys  
or Wires**

**RATING: 15 Amperes 550 Volts, A. C. 250 Volts, D. C.**

Expertly designed, sturdily built, to supply smooth, safe uninterrupted power to traveling hoists. Swivel base permits cord to be fed in any direction; thus, mounted at the mid-point, a type "YS" Reelite with 45 feet of cord serves 90 feet of track, straight or with one or more bends. Excess cable always reeled up safely out of the way, where it cannot tangle, kink or break.

Typical of fine construction throughout is the Dupont Neoprene jacketed conductor cable . . . tougher, longer-wearing and resistant to oil, heat, acid fumes and other conditions which cause ordinary cable to deteriorate.

Solderless line connections are made direct to terminal block. Oil-less bearings at all points of rotation.

Sold Through Electrical Wholesalers

**APPLETON ELECTRIC COMPANY**  
1728 Wellington Ave. • Chicago 13, Illinois  
14 Branch Offices and 7 Resident Representatives  
in all Principal Markets



### SEND TODAY!

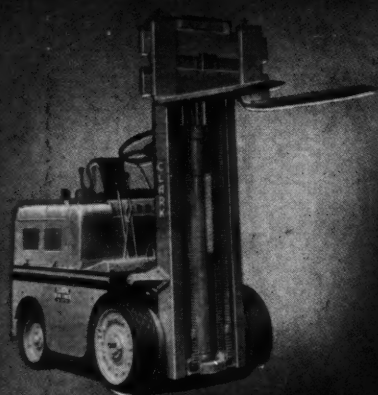
Write for your free copy of 30-page Bulletin No. 504 which gives complete information on all Reelites—Portable, Constant Duty and special types. Or see Sweet's File, Page 2a/15.



# APPLETON

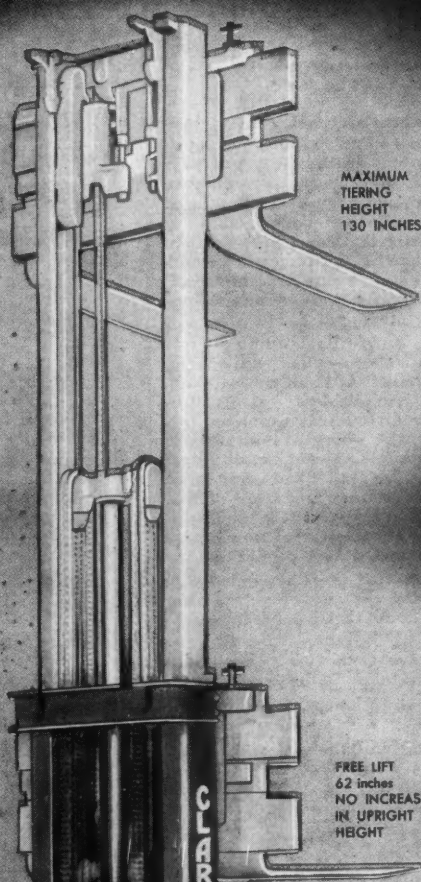
CONDUIT FITTINGS • LIGHTING EQUIPMENT • OUTLET AND SWITCH BOXES  
EXPLOSION-PROOF FITTINGS • REELITES





# is the **CLARK HI-LO-STACK**

A simple, effective answer to the familiar need for a machine combining *maximum lift* to make full use of storage air rights, and *minimum height* to carry a load comfortably under 8-foot overhead clearances.

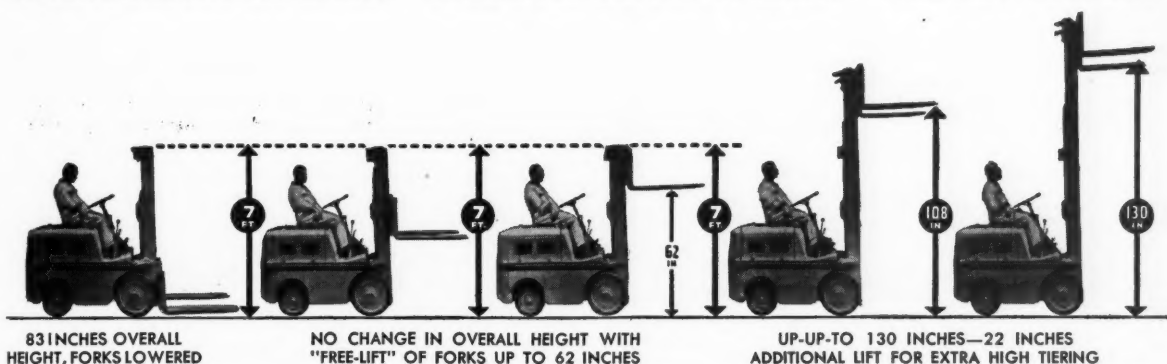




# MATERIAL HANDLING *News*

With this high-lift, low-clearance attachment, a Clark fork truck can take material through a freight car door and tier loads to the car roof, as well as tier loads rafter-high in the warehouse.

**TIERING HEIGHT 130 Inches • COLLAPSED HEIGHT 83 Inches • FREE LIFT 62 Inches**



That "free lift 62 inches" is the vital specification of HI-LO-STACK, Clark's new high-lift, low-clearance attachment. It means that the forks can be raised 62 inches from the floor before there is any increase in the overall height of the machine.

## DOES DOUBLE DUTY

You recognize instantly the practical benefits of the HI-LO-STACK—it enables a fork truck to take a load through the 7-foot door of a box-car and tier loads to the roof of the car, or to tier unit loads to the rafters in the warehouse. Heretofore, with conventional lift mechanisms, the increasing height of the vehicle made it impossible for the same machine to perform all these operations; making it necessary, in many handling operations, to use two machines—one for loading and unloading cars and another for high tiering in the warehouse.

Also HI-LO-STACK is an exceedingly simple mechanism. It has only one lift cylinder, and a single set of uprights with slide members inside. Lifting is accomplished with un-

sually low hydraulic pressure, which minimizes possibility of leakage.

## SIMPLE, STURDY, DEPENDABLE

It adds up that HI-LO-STACK is a typical Clark development—sturdily built, simple as can be, a thoroughly dependable unit; a good example of the sound engineering and incomparably rich knowledge of handling operations for which Industry looks to Clark.

Whether your business is large or small . . . if there is material being handled . . . surely there is opportunity for savings . . . consult Clark.

## CLARK CREATES BIGGER VALUES—read it in "MATERIAL HANDLING NEWS"

Most of the major units in Clark machines are designed for maximum interchangeability and are mass-produced in Clark's own plants. Result: vital production economies and low first cost—bigger values for your investment. The new "Material Handling News" tells the story, write for it.

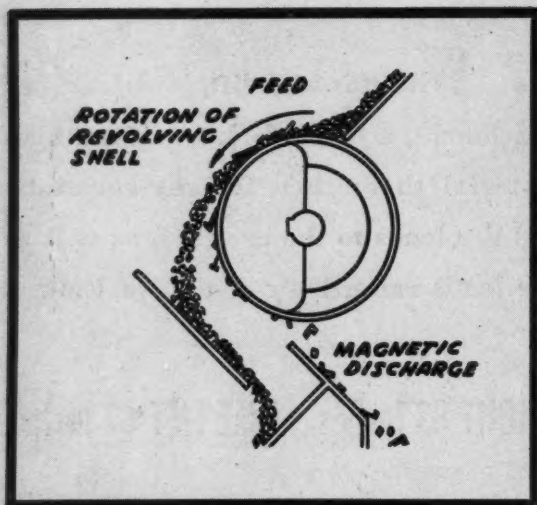


# CLARK

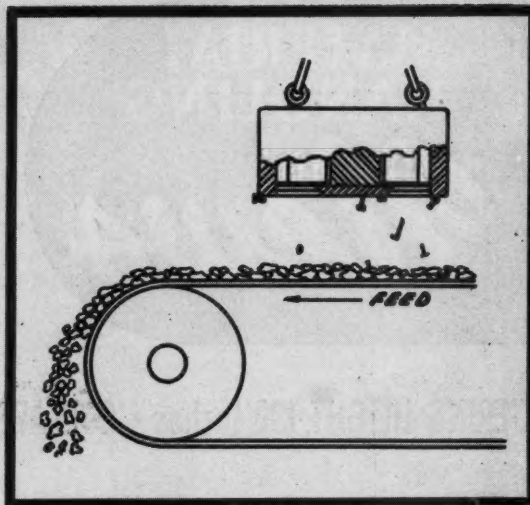
GAS AND ELECTRIC POWERED  
FORK TRUCKS  
AND INDUSTRIAL TOWING TRACTORS



CLARK EQUIPMENT COMPANY, TRACTOR DIVISION, BATTLE CREEK 13, MICH.  
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD



**DRUM TYPE SEPARATOR.** Highly effective in purification of fine materials and separation of secondary metals and minerals.



**SUSPENDED SEPARATORS.** Material moving on continuous carrying surface below magnet is freed of unwanted tramp metals.

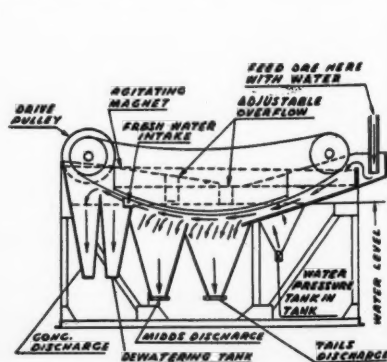
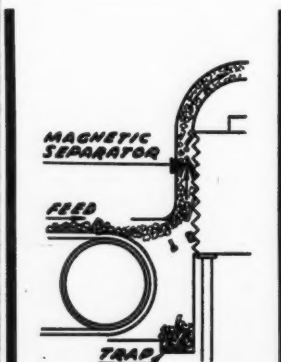
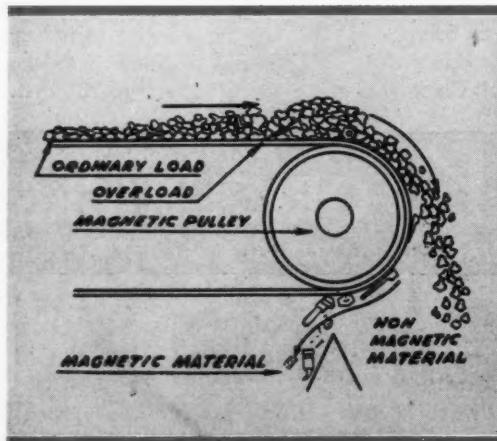
# How American Industry uses *Magnetic Separators*

Magnetic separators are important material handling aids because they make possible high-volume continuous flow of purified bulk materials. Their four primary functions—removal of tramp metal, concentration, purification, reclamation—are discussed here. A list of points is included as a guide to choice of the correct type for your product and process.

**MAGNETIC PULLEY.** Usable materials are projected in normal trajectory while tramp materials are trapped.

**RECTANGULAR.** Vertical installation as used in textile factories.

**WET TYPE.** Concentrations of various minerals collected according to pull.



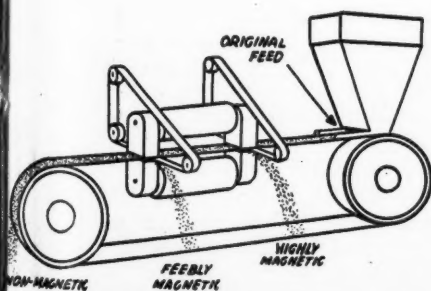
**T**HE use of magnetic separators made mass production possible in many industries, because they permitted large-volume, rapid cleaning and purification of raw materials on a continuous basis. This points up their significance as vitally important accessories in material handling.

Since the beginning of industrial mechanization a monkey wrench—or any foreign object—in machines stood for trouble in production processes. Industrial ingenuity dealt with the problem by designing devices for trapping these foreign materials, eliminating danger to personnel, machinery and products.

Shortly before the turn of the century, devices involving the holding power of electricity were introduced. They were called magnetic pulleys since they utilized the drawing and holding powers of magnetism to keep tramp materials from reaching vital parts of machinery. They were improved, developed and applied to an ever increasing list of industries for purifying, concentrating and cleaning materials. As such, they became known as magnetic separators.

Separators may be grouped in two main divisions—electric and non-electric, each with its own divisions and specialized applications for particular problems. An enumeration of all special types available for particular industrial processes would fill volumes. Hence, this article is confined to types that are widely used in conveyor and other handling applications.

**CROSS BELT.** Magnetic products are wrested from less valuable materials on conveyor.



**INDUCED ROLL.** Each roll induced to greater power.



To many, the term "permanent magnets" represents an unknown quantity. Therefore, the question arises "what are permanent magnets?" Basically, permanent magnets are shaped pieces of ferromagnetic material consisting of iron alloys which, once having been magnetized, show definite resistance to external demagnetizing forces. The magnetic flux or strength introduced by the magnetizing force does not disappear when the magnetizing force is removed as it would if material were pure iron, but remains for very long periods of time, or as the term implies—permanently.

The basic function of the permanent magnet is to supply a powerful magnetic field without application of external energy. "Hard" or permanent magnets differ from the old horseshoe or "soft" magnets in that a larger applied field or magnetizing force is needed to induce the same amount of resultant mag-

netism in the material. Permanent magnets require high coercive forces, such as heat over 600°F., contact with other magnetic fields, and severe shock, to remove the resultant magnetism, whereas "soft" magnets need only a slight coercive force to remove the remaining magnetism.

### Three General Types

Both electric and non-electric separators are available in three main types: 1. Magnetic pulleys. 2. Magnetic cylinders or drums. 3. Suspended magnets. (Lifting magnets, used as a "grapple" for moving materials from one point to another, will be covered in a later article.)

**Magnetic Pulleys and Pulley-Type Separators:** The magnetic pulley was the original development used for removing tramp metals from raw materials being conveyed through production processes. Coal would be one of many pos-

### A Table of Ores and Minerals

indicating the approximate magnetic attractability as compared to iron is given. The minerals, when associated with a non-magnetic material or with each other, without exception almost, are amenable to separation.

#### RELATIVE MAGNETIC ATTRACTIVE FORCE OF VARIOUS MINERALS

Material	Attractive Force Iron—100	Material	Attractive Force Iron—100
Iron	100.	Bornite	.22
Magnetite	40.18	Apatite	.21
Franklinite	35.38	Willemite	.21
Ilmenite	24.70	Tetrahedrite	.21
Pyrrhotite	6.69	Talc	.15
Biotite	3.2	Arsenopyrite	.15
Siderite	1.82	Magnesite	.15
Hematite	1.32	Chalcopyrite	.14
Zircon	1.01	Gypsum	.12
Limonite	.84	Fluorite	.11
Corundum	.83	Zincite	.10
Pyrolusite	.71	Celestite	.10
Manganite	.52	Cinnabar	.10
Calamine	.51	Chalcocite	.09
Garnet	.40	Cuprite	.08
Quartz	.37	Smithsonite	.07
Rutile	.37	Orthoclase	.05
Cerussite	.30	Stibnite	.05
Cerargyrite	.28	Cryolite	.05
Argentite	.27	Enargite	.05
Orpiment	.24	Senarmonite	.05
Pyrite	.23	Galena	.04
Sphalerite	.23	Niccolite	.04
Molybdenite	.23	Calcite	.03
Dolomite	.22	Witherite	.02



sible examples. The magnetic pulley, which serves as the drive pulley for conveyors, is the most popular type from the standpoint of frequency of use, according to manufacturers.

The field of applications for magnetic pulleys is wide. It includes almost every type of industry in which bulk non-magnetic materials are used in production. Examples of such industries are: coal, feed and grain elevators, ceramic, sugar refineries, cement mills, disposal plants, paper mills, flour mills, coffee roasting plants, food products of many kinds, garbage plants, rubber reclaiming, steel plants, non-ferrous foundries, coke works, distilleries, textile mills and many others. Simple purification by the removal of tramp iron from the flow of material is easily accomplished. Further purification of raw materials through removal of secondary metals can be obtained with multiple-pulley units. These units can be adjusted to accommodate materials of various sizes and magnetic qualities.

### Theory Is Simple

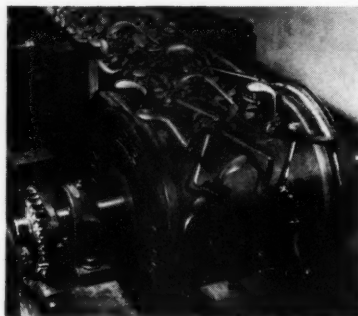
The theory of operation is relatively simple. Raw material, moving on a conveyor belt, reaches the magnetic pulley and separation takes place. The usable material is discharged by the normal trajectory for further processing, while tramp metals are held to the conveyor by the magnetic force expended through the belt by the magnetic pulley. As the belt moves from the influence area of the pulley the magnetic force is dissipated and the captive metal objects fall into bins or other receptacles provided for their disposal. The efficiency of this continuous and automatic method can be appreciated when one recalls that years ago labor was used to pick over bulk materials in order to remove foreign matter.

Two popular designs of magnetic pulleys are available. 1. The magnetic coils cover the entire inside circumference of the pulley, providing a complete circle magnet. 2. Magnetic coils cover only one half the inside circumference, and the influence is thus confined to that part of the drive pulley. Material handling and plant engineers would do well to consult specialists in the

separator field in order to determine the type best suited to a particular process.

### Magnetic Drums or Cylinders

For the separation and purification of relatively fine materials, magnetic drums or cylinders have been applied to hoppers. These types are designed especially for cleaning secondary metals, such as brass, bronze and aluminum borings from iron and steel particles. They are automatic in operation.



**REVERSE ACTION.** Usable materials are retained while waste is projected.

The drum or cylinder is normally enclosed in a housing or hopper which feeds the material over it. As in the case of the pulley mentioned earlier, the magnetic material is held to the outside circumference until it passes out of the magnetic field, when it is discharged for later reclamation or disposal. Non-magnetic material passes over the drum in the path of the normal trajectory.

Multiple-roll units, usually equipped with induced or high intensity roll stages, are a fairly recent development in the magnetic drum-type of separator. For some materials, it is necessary to have as many as seven rolls to accomplish the degree of purification or separation required in the process. Each successive roll in the stand is induced with a greater magnetic intensity than the preceding one. In this way, material with the greatest magnetic attraction is immediately removed in passing over the first roll. Minerals such as zincite, senarmontite, galena, or witherite, all having low attractive forces, are removed only when they reach the roll of highest magnetic intensity.

Separations heretofore considered impossible have been accomplished and materials not ordinarily considered magnetic are said to be successfully removed on the induced roll unit. This method has opened the way for the use in mass production of many minerals which were previously avoided because of the high cost of separation. Thus, the development of highly powered magnetic separators has made possible the use of new materials which were formerly avoided because of excessive handling costs in processing. At the same time the field of application of magnetic separators has been widened beyond limits not thought possible a relatively few years ago.

### Suspended Separators

The third type of magnetic separator is suspended over the material, and hence the name "suspended." These may be either circular or rectangular. They are applied at points where pulleys or drums are not recommended. While the disposal of the trapped metal is not automatic (as in the case of the pulley and drum types), they do an equally effective job. The only difference is that the face of the suspended magnet or separator must be cleaned off at certain intervals.

In operation, this type of magnet is suspended over a continuous carrying surface (as for coal or wet concrete) and removes tramp iron from the material passing under it. It is also popular as a permanent installation in chutes, either vertical or horizontal. Tramp iron is caught on the face of the magnet and held there, thus serving to purify the material or remove foreign matter that is hazardous to machinery.

In vertical installations, the trap is usually built below the magnet's face. When the magnetic force is cut off, the tramp iron drops into the trap (below the chute level), from where it is removed. In horizontal and diagonal installations the magnetic separators are designed with built-in traps, which swing open to discharge the trapped iron when the magnetic force is discontinued.

The foregoing description is applicable to a considerable extent



both to electric and non-electric separators. The individual problem or intended use in the plant must be considered before any type is selected and installed.

### Special Types

As mentioned earlier, there are too many specialized designs to be considered in this article, whose interest is primarily in those types applied to bulk material handling. In the following paragraphs a few of the more popular special applications of them are discussed.

**Cross Belt Type:** It operates on the same principle as the induced roller type. Generally speaking, it is more widely used for concentration where valuable magnetic products are wrested from the less valuable or worthless non-magnetic material. The material moves on a vibrator or conveyor belt over which are suspended one or more magnetic zones. A belt passing across and above the main conveyor in the magnetic zone acts as the carrying surface for the separator. The magnetic particles in the bulk (traveling on the main belt) are attracted to the magnet and adhere to the lower side of the belt traveling laterally on the higher level. The material is thus carried to the side out of the magnetic zone, where it is dropped off into suitable receptacles. This type of selective separation is frequently employed to separate ferrous and non-ferrous materials.

**Magnetic Filter:** Separators of this type come in various shapes and sizes and are used for purifying liquids and materials in solution. This application involves processes using finely divided material from which contaminating iron must be removed. Examples of such materials are talc, frit, clay, feldspar, enamel and other powdered substances.

**Wet Type:** These are used where concentrations of minerals of various magnetic susceptibilities are desired. In operation, the wet feed enters the machine and passes to the underside of a conveyor belt. Magnetic material is held to the belt by magnets with which the belt is in contact. These magnets form three selective pickup sections of decreasing intensity. Non-magnetic tailings are dropped off at the first section; slightly magnetic middlings



• Here's the modern, low cost, positive way to remove tramp iron from materials carried on conveyor belts. No wiring . . . no electrical accessories . . . no operating cost . . . no maintenance . . . good for life . . . tremendous power . . . completely automatic — The new Dings PERMA-PULLEY is a revolutionary contribution to magnetic separation. You can install it and forget it!

Backed by 50 years of magnetic separator manufacturing experience, this new pulley offers these plus features that assure you of maximum tramp iron removal:

- Extra high strength grade of Alnico
- Closely spaced poles
- Magnetic strength equal across entire belt width
- Crowned face to prevent belt weave
- Extremely high surface strength

Dings PERMA-PULLEYS are available in 53 sizes with shaft diameters to suit your requirements. Fully described in NEW BULLETIN No. 260-A which includes comparative Magnetic Strength Curve proving that you get greater protection with DINGS! Send for a copy.

**DINGS MAGNETIC SEPARATOR CO.**  
4707 W. McGeogh Avenue, Milwaukee 14, Wis.

**Dings**  
"HIGH INTENSITY"

### \*MOST POWERFUL NON-ELECTRIC PULLEY ON THE MARKET!

Dings offers you the most powerful magnetic pulleys for the job:

1. For burden depths up to two inches — The Dings Perma-Pulley with its extremely high surface strength.
2. For burden depths over two inches — The Dings "High-Intensity" Electromagnetic Pulley with its great depth of magnetic penetration.

**MAGNETIC  
PERMANENCE  
GUARANTEED  
for life!**

at the second less intensive section, and the highly magnetic concentrations discharged at a point outside the magnetic field.

This list could be easily extended

and method of operation are the same. And this, of course, applies to all types of separators.

#### Points to Consider

To recapitulate, their four pri-

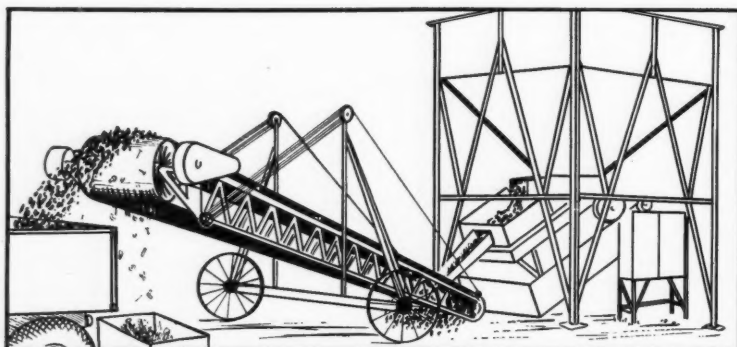
ration of magnetic ores from their associated non-magnetic gangue.

3. Purification of non-magnetic substances—removal of unwanted iron particles from food stuffs, plastics, chemicals, reclaimed rubber, and non-ferrous machine shop scrap.

4. Reclamation of iron—salvage of reusable iron from foundry sand, slag, and other materials which often contain a sufficient quantity to more than pay for the collection effort.

From an operating standing, certain factors must be considered if the separator application is to be efficient. Among them, these questions must be answered. 1. Is the material wet or dry? 2. What is the size of the material to be processed?

3. In what stage of the production process will the separator be located? For example, it's important whether this is to be before the crusher or the pulverizer. 4. What is the volume of the bulk material to be processed in an hour or day? 5. What is the speed of the conveyor? 6. What is the magnetic intensity of the material to be sepa-



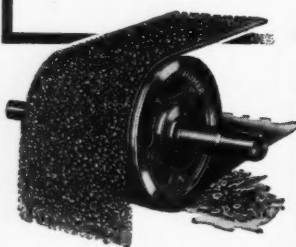
**PORTABLE EQUIPMENT.** Removing tramp metal objects from stoker coal is one of many magnetic pulley applications.

by including such specialized designs as magnetic humps for air lines and gravity flow drops, traps for installation in pipe lines and numerous others to fit individual processing requirements. Many of these are varied in design, size and shape that they hardly resemble each other, but their basic principle

many functions are as follows: 1. Removal of tramp iron—for protection of crushers, grinders, screens, and other machinery, as well as for prevention of fires and explosions caused by sparks from iron in contact with material in process.

2. Concentration of magnetic substances. This involves the sepa-

## Homer PERMANENT MAGNETIC, NON-ELECTRIC Separators



Homer permanent magnetic pulleys offer you the most in protection against tramp iron infiltration into finished products or expensive machinery. Employing powerful Alnico magnets, Homer Permanent Magnetic Pulleys range in size from 12" to 24" in dia., with widths to 60". Homers handle burden depths from 2½" to 5" depending on material.

Plate type magnetic separators, single or triple gap, standard or hinged mounting are available for all types of tramp metal separation. Standard widths range from 4" to 26". Special sizes available. Cast aluminum deck furnishes complete self-insulation. Cast aluminum cover shields powerful Alnico assembly against dust and moisture. No wires or electrical accessories necessary



PRODUCERS OF MAGNETIC SEPARATOR EQUIPMENT SINCE 1923

**The HOMER Manufacturing Co., Inc.**

DEPT. E-11

LIMA, OHIO

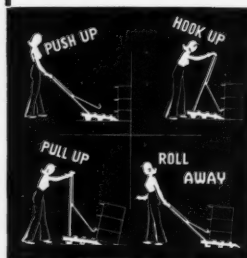
PERMANENT MAGNETIC SEPARATORS — PLATE TYPES AND PULLEYS

YOU AND

# "George"

WILL GET ALONG FINE

"George" takes over, in your plant, the tough job of Tote Box Manager. No more back strain and employee fatigue . . . metal filled boxes are hauled with ease. Hook is inserted into box handle, draw-back leverage of truck handle glides load over bevel edge onto upper rollers as lower rollers carry truck to destination. Simple, fast, safe, anyone can do it. Save accidents, cut costs with "George" . . . all metal, long life, low cost. Send for Bulletin F.



**ROLOCK INCORPORATED**  
FAIRFIELD, CONNECTICUT

3RG48

rated, purified or concentrated?

From the foregoing it can be seen that selection of the correct type of magnetic separation equipment should be made only after careful study of the processing details. Many manufacturers of this equipment maintain complete laboratories where tests with the user's materials are made under actual operating conditions. On the basis of the data developed during these tests the most efficient design and method for a particular need can be determined.

It is also apparent from this description that the full range of magnetic separators are important material handling devices. They have not only aided the development of mass production in continuous bulk handling, but have also reduced costs of production processes, made available new and better materials, improved product quality besides providing protection for personnel and machinery. Many of the separators described are applicable to permanent or fixed installations as well as to portable loading and unloading conveyors.

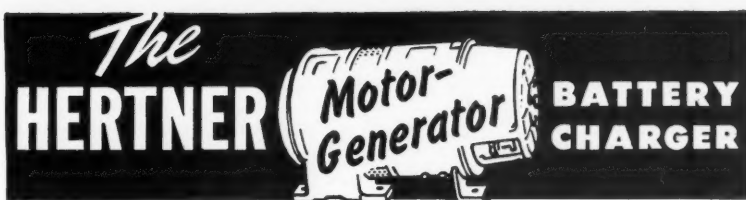
#### ACKNOWLEDGEMENTS:

Sterns Magnetic Manufacturing Co.  
Dings Magnetic Separator Co.  
Eriez Manufacturing Co.

**HANDLING REDUCED.** Handling of replacement automotive parts has been considerably reduced in an automotive parts plant through the use of caster-equipped trucks, equipped with sloping shelves. The sloping shelves



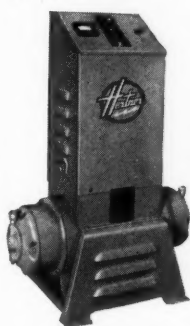
keep the circular parts in their racks during truck movements. In the inspection and etching operation shown, the operator works with two trucks—taking from one and depositing in the other vehicle. After the load has been processed, the truck load is rolled to the packaging department without additional handling.



## means Increased PERFORMANCE Records

### *for* **MOTORIZED HAND-LIFT-TRUCK BATTERIES—TYPE "H" CHARGERS**

Single circuit Model H  
Write for Bulletin 101



Here's what  
**HERTNER CHARGERS**  
give you . . .

- Completely enclosed control panels prevent possibility of accidental contact by operator.

Motor-generator sets specifically designed for the battery to be charged.

Completely automatic operation from start to completion of charge.

Long life and trouble-free operation.

Multiple circuit Model H  
Write for Bulletin 102



### *for* **ELECTRIC INDUSTRIAL TRUCK BATTERIES—TYPE "K" CHARGERS**

Single circuit Model K  
Write for Bulletin 104



- Both types of Hertner chargers are available in single-circuit units for charging one battery, and in multiple units for charging two or more batteries simultaneously.

Your charging equipment is fully as important as your truck and battery equipment. For the best in charging equipment, insist upon Hertner. Your electric truck representative will gladly help you select the Hertner charger that meets your requirements and which will keep your trucks operating at peak performance.

Multiple circuit Model K  
Write for Bulletin 108



**THE HERTNER**

**ELECTRIC COMPANY**  
A General Precision Equipment Corporation Subsidiary  
MOTORS • MOTOR GENERATORS • GENERATOR SETS

12690 ELMWOOD AVENUE

CLEVELAND 11, OHIO



# BRUSCO

## LABOR SAVING MATERIAL HANDLING EQUIPMENT



### DROP DOOR PARTS BOX

There are Brusco heavy parts boxes designed to fill any need. Many customers find the Brusco Drop Door Box just the answer to their material handling problem.



Brusco Boxes are fabricated from heavy gauge steel sheets, corrugated for extra strength and reinforced with heavy steel angles. Legs have skid plates for easy moving. Standard sizes:

24 x 24—26½ x 36  
36 x 42—30 x 48  
36 x 48—36 x 60  
Depth 18", 24" or 30"

Boxes equipped with card holders for stock records.

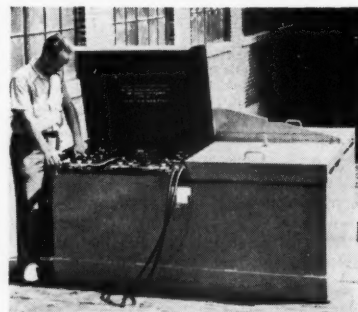
Orders or inquiries should specify quantity, width, length and depth of box desired. Also state underclearance required and estimated weight of load. We are able to fulfill any special requirements.

**MOBILE WRAPPING STAND.** A caster-equipped combination drain and wrapping stand is used in the packaging department of a large automotive parts plant. The woven wire tote boxes holding the parts are transferred from the coating machine and



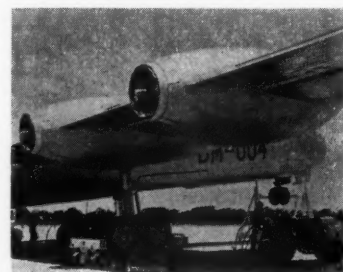
placed in a recessed section of the stand. The equipment can be moved away from the machine for the wrapping operation. Excessive coating material draining from the parts is salvaged in a container on a shelf beneath the recessed section.

**SEVEN TONS OF POWER.** Believed to be the largest in the world, this 36-cell single-tray electric storage battery for industrial trucks has been shipped by the Gould Storage Bat-



tery Corp. to a large midwest steel producer. Weighing more than seven tons, it has a capacity of 1500 ampere hours at the six hour rate and is designed for use on a huge 30,000-pound ram truck handling coils of strip steel.

**DOUBLE WHEEL, FLOATING HUB casters, 18 inches in diameter, are used on positioning and handling dollies for huge Army bombers. Four**



swivel casters, each having an operating capacity between 20,000 and 25,000 pounds, are used on the dollies supporting the bomber, according to The Bassick Co.

**BRUMMELER STEEL PRODUCTS CORPORATION**  
DEPT 35 GRAND RAPIDS, MICH.



# HYSTER KARRY KRANE

**Mobility—Maneuverability—first cost—and low cost of owning and operating** make the Hyster Karry Krane the most widely used mobile crane in its class.

Karry Krane rides on pneumatic tires. It can go anywhere over any road surface; can get into and work in small areas. Karry Krane is an ideal machine for loading and unloading gondolas, flat cars or automobile vans; for warehouse and dock work; for moving heavy or bulky materials to or from any part of a plant or storage yard.

Hyster Karry Krane is on a current delivery basis. See your Hyster distributor for a demonstration. Write for literature.



**CURRENT DELIVERY**  
on the lowest price  
10,000-lb. mobile  
crane on the market

## SOLD AND SERVICED BY THESE HYSTER DISTRIBUTORS

ALASKA—Northern Commercial Co.  
BROOKLYN, N. Y.—A. S. Rampell  
BUFFALO, N. Y.

Rapids Handling Equipment Co.  
of Buffalo, Inc.  
CALGARY, ALTA.

A. R. Williams Machy. Western, Ltd.  
CHICAGO, ILL.—Hyster Company  
CINCINNATI, O.—Oral T. Carter & Associates  
CLEVELAND, O.—Morrison Company  
DALLAS, TEX.—C. H. Collier Company  
DENVER, COLO.—Paul Fitzgerald  
DETROIT, MICH.—Bentley & Hyde  
GRAND RAPIDS, MICH.—Bentley & Hyde  
HALIFAX, NOVA SCOTIA

A. R. Williams Machy. Co. Ltd.  
HONOLULU, T. H.—Electric Steel Foundry Co.  
HOUSTON, TEXAS—C. H. Collier Company  
INDIANAPOLIS, IND.

Central Rubber & Supply Co.  
JACKSONVILLE, FLA.—L. S. Teague Eqp't. Co.  
KANSAS CITY, MO.  
Industrial Power Equipment Co.

LOS ANGELES, CALIF.—Hyster Company  
LOUISVILLE, KY.—Embry Brothers, Inc.  
MEMPHIS—Hyster Co. of Louisiana, Inc.  
MILWAUKEE, WIS.—Hyster Company  
MINNEAPOLIS, MINN.—W. S. Nott Company  
MOBILE, ALA.—S & T Equipment Co., Inc.  
MONTREAL, P. Q.

A. R. Williams Machy. Co., Ltd.  
NEW ORLEANS, LA.  
Hyster Company of Louisiana, Inc.  
NEW ROCHELLE, N. Y.  
Eastern Industrial Sales Co.  
OTTAWA, ONT.  
A. R. Williams Machy. Co., Ltd.  
PHILADELPHIA, PA.

Rapids Handling Equip. Co. of Phila., Inc.  
PHOENIX, ARIZ.—Equipment Sales Company  
PITTSBURGH, PA.—Equipco Sales Company  
PORTLAND, ORE.—Hyster Sales Company  
ST. JOHNS, N. F.—City Service Company, Ltd.  
ST. LOUIS, MO.—Wharton L. Peters  
SALT LAKE CITY, UTAH  
Arnold Machinery Company

SAN FRANCISCO, CALIF.—Hyster Company  
SEATTLE, WASH.—Hyster Company  
TORONTO, ONT.

A. R. Williams Machy. Co., Ltd.  
VANCOUVER, B. C.  
A. R. Williams Machy. Western, Ltd.  
VICTORIA, B. C.  
A. R. Williams Machy. Western, Ltd.  
WINNIPEG, MAN.  
A. R. Williams Machy. Western, Ltd.  
YUKON TERRITORY  
Northern Commercial Company

## HYSTER COMPANY

THREE FACTORIES

2931 N. E. Clackamas, Portland 8, Oregon  
1831 North Adams Street, Peoria 1, Illinois  
1031 Meyers Street . . . Danville, Illinois



In addition to above, Hyster Export Dealers are located in 30 foreign countries.

# ON THE



# PALLET

## NEWS · VIEWS · TRENDS

**T**HE Illinois Institute of Technology has planned an evening course for next semester in Materials Handling, I. E. 324. It will cover the economics of handling and conveying materials, descriptions of types of handling devices and their applications and movements as affecting layout, processing, and storage. The instructor will be Irving Footlik, assistant to the vice president in charge of production, at the Ekco Products Company. He has had previous experience as superintendent of materials handling and warehousing for the same company. He is a man with successful teaching experience. The course will be given Friday nights at 6:20 to 8:00 P.M. at the Institute at 3300 So. Federal Street.

**T**HE Cambridge Wire Cloth Co., Cambridge, Md., announces the death of its Chicago representative, George B. Fletcher, on December 2, 1947. Fletcher had been associated with the company for many years.

**C**ONTINUED study of modern methods of handling and storage of all types of materials is under way in Australia by the Material Handling Bureau in the Secondary Industries Division of the Department of Post-War Reconstruction. Functions of the bureau are to continue the work on material handling started by the Department of Munitions, publish booklets and information, provide advice to industry, continue research for improved methods, present lectures, demonstrations and addresses, and study ways of reducing costs.

The results of these studies have been printed in charts and booklets, which are now being published in a material handling book of 500 pages. Booklets on the subject of handling in various industries are distributed periodically.

**T**HE Third Annual Industrial Packaging and Materials Handling Exposition, sponsored and produced by the Industrial Packaging Engineers Association, will be held at Chicago, October 5 through 7, 1948, according to an announcement by A. C. McGeath of the American Box Board Company, who has been re-appointed as General Chairman. Hotel Sherman will again be the site for the third Exposition. Arrangements have been made to provide more exhibit space than was available last year. The Forum, which

has won widespread acclaim for its high level of general interest and educational value, will again be repeated. The Protective Packaging Contest, held for the first time at I.P.E.A.A.'s last Exposition, has been expanded and will feature awards in various classifications. Further information may be had by writing to the Industrial Packaging Engineers Association, 20 West Jackson Boulevard, Chicago 4, Illinois.

**U**SING a special magnet, an Atlanta physician recently removed a 1½ inch nail that had been lodged for six days in the duodenum (first part of the small intestine) of a four-year old boy. In this case, the first on record in which an object was removed from this part of the body without a surgical operation. Nearly six hours were required for the magnet to reach the nail, but only two minutes for the magnet and nail to be drawn back into the stomach and up through the esophagus.

**A**S a result of its recent National Election, the Industrial Packaging Engineers Association announces the election of the following individuals as officers of the National Association:

R. F. Weber, International Harvester Company, Chicago, Board Chairman; P. O. Bogt, General Electric Company, Schenectady, President; J. H. Singer, Rathborne Hair & Ridgway Co., Chicago, Vice-President; R. C. Sell, Koehring Company, Milwaukee, Vice-President; A. H. Dobler, Yale & Towne Mfg. Co., Chicago, Vice-President; J. L. Ware, Sears Roebuck & Co., Chicago, Treasurer; Stanley Price, Western Electric Co., Chicago, Secretary.

The new officers will serve for the next two years, their terms expiring October, 1949.

Paul O. Vogt, a charter member of I.P.E.A.A., and its first Vice-President, succeeds R. Frank Weber, who has been elevated to the newly created position of Chairman of the Board.

The three newly elected Vice-Presidents are all former members of I.P.E.A.A.'s Board of Directors, and their election marks the establishment of three divisions within the National Association: Mr. Raymond C. Sell of the Koehring Company is Vice-President of Transportation; Mr. J. H. Singer of Rathborne Hair & Ridgway Co. is Vice-President of Packaging; Mr. A. H. Dobler, Yale & Towne Manu-

(Turn to page 67)

# \$15,000 Glass-Packed Load arrives undamaged

**Helene Curtis Industries ships 18 tons of cold wave shampoo from Chicago to Los Angeles without damage . . . uses Acme Unit-Load Bands for bracing**

As Helene Curtis Industries, large manufacturers of beauty supplies, expanded, shipping problems grew.

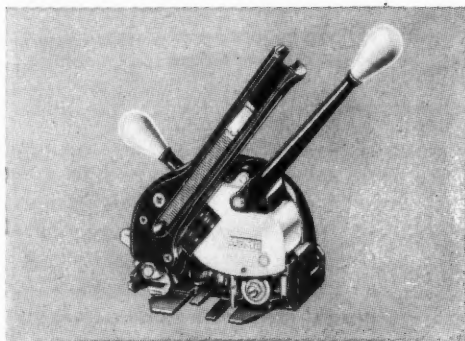
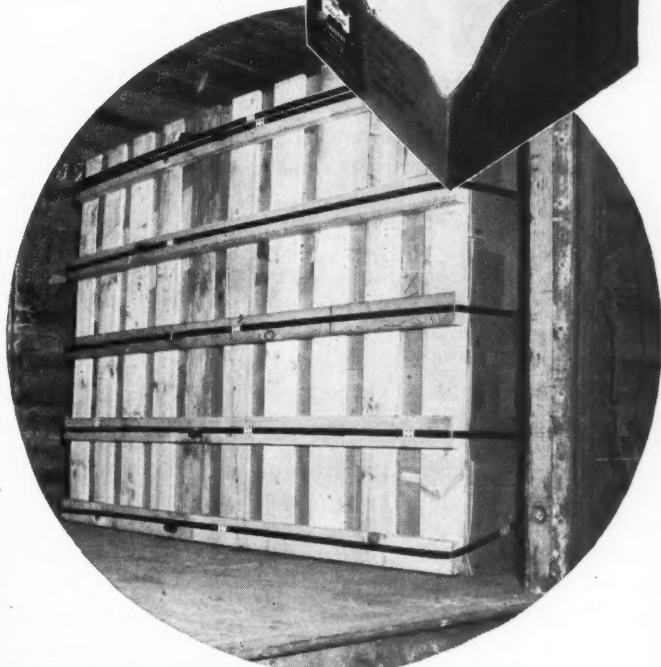
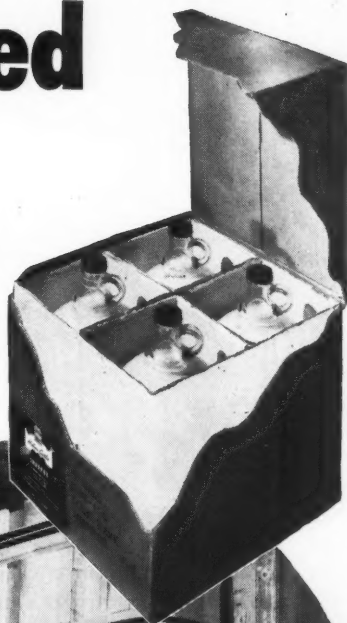
Many sizes of containers required considerable study of stowing and bracing in freight cars, so an Acme Shipping Specialist was called in for advice. The successful shipment (shown in the pictures) was one result.

## How About You?

Ask an Acme Shipping Specialist about your shipping methods. He may be able to give you better shipping at lower cost.

Write or mail the coupon for a free copy of "Savings in Shipping," case histories of Acme's services and savings for many industries.

Packages like this proved strong enough to carry 3,000 gallon jugs of cold wave shampoo from Chicago to Los Angeles without damaging a single jug! The secret: A freight car properly braced with low-cost Acme Unit-Load Bands.



More savings ahead for Acme Steelstrap users—No. 3 Steelstrapper, the lightest tool made, is now available. Magazine holds 100 seals. Tensions, seals, and cuts the strap in one operation. Small base requires only 5-inch strapping surface. Two levers working in opposite directions make for better balance and easier handling.

Here's the neat, practical way this \$15,000 load was braced. There is a minimum of lumber dunnage and maximum use of space. Each carton weighs 48 pounds, and 750 cartons were carried in a car.

Acme Steel Company, Dept. F-28  
2838 Archer Avenue  
Chicago 8, Illinois

Please send me a copy of your case history booklet, "SAVINGS IN SHIPPING."

Name .....

Company .....

Address .....

City ..... Zone ..... State .....



## ACME STEEL COMPANY

NEW YORK 7 ATLANTA CHICAGO 8 LOS ANGELES 11

FEBRUARY, 1948

ACME STEEL CO.  
CHICAGO



# PACKAGING MECHANICS



## When You Dip Before Packing

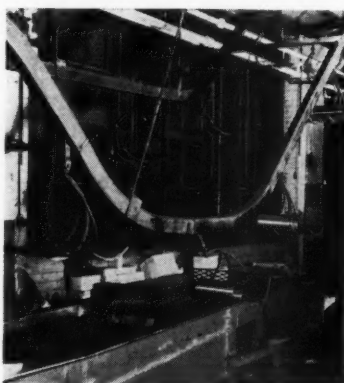
*Thousands of these fragile parts—in more than a hundred different sizes and types—travel from production through dipping straight to packaging. The arrangement for dipping and draining is as ingenious as it is effective.*

AMONG the many thousands of types of automotive parts manufactured by Thompson Products Corp., Cleveland, are piston sleeves which are made in more than a hundred types and sizes. Made both as replacement parts and for original equipment, these gray-iron cylindrical units, also called liners, have eggshell thin walls. The finish required on the inside diameter is held to a few thousandths of an inch, and the combination of thin walls plus close tolerances of highly polished surfaces calls for utmost care in the handling preparatory to packaging.

Dropping of these units from a two-foot height even onto a wood floor would cause out-of-roundness and scrapping of the part.

The specific packaging problem here is that these piston sleeves must be dipped into an anti-corrosive fluid just before being placed in the corrugated shipping containers. Effective draining is therefore essential. Manual manipulation of the high-production units at this point could easily become a bottleneck, requiring extra handling operations. It was desired to accomplish both dipping and draining mechanically by a continuous

method, and at the same time to meet the requirements for packaging. This objective was accom-



PLEATED CANVAS BELT draining conveyor delivers sleeves to packing, ready for cartons.

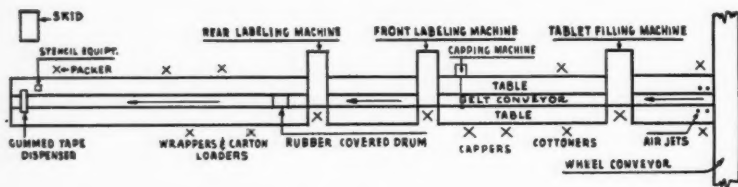
plished in every detail by the method described here.

### Safe Unloading

After inspection (following honing), the piston sleeves are placed on the expanded metal cradles suspended from an overhead chain conveyor, as shown, one sleeve to each carrier. Loading is done at three different stations after final inspection. The light-duty conveyor travels at a rate of 12 F. P. M. and delivers the units to the packing department 170 feet away.

The first operation in the packing

Flow diagram of layout designed for draining sleeves before packaging.





department is to coat the high-finished sleeves with the corrosion preventive fluid. Mechanical dipping required a high degree of ingenuity, due to the large number of sizes and types of sleeves to be coated. Thompson engineers designed special equipment which combined three specific types of handling devices, as follows. 1. A chain conveyor for dipping, equipped with special retainers. 2. A rigid-arm elevator or unloader. 3. A specially designed cleated canvas belt whose carrying surface is also pleated.

As can be seen from one of the photos, a vertical curve in the overhead chain conveyor serves to position the loaded cradles for transfer of the piston sleeves to the oiler tank. At the bottom of the dip, the arriving cradle is two inches below the level of the tank. The lower part of the cradle is thus held and the hinged carrier is tilted forward while slowly being lifted. This causes the piston sleeve to roll off onto the pitched table of the oiler.

The fragile part must be prevented from rolling any distance, since the impact would be sufficient to cause damage. This is accomplished by the notched wooden flights, serving as retainers, which are mounted on the conveyor chain. Resting against the retainers, the pieces roll down into the oil, while the empty cradle, traveling on the inclined chain conveyor, is lifted free of the tank for return to the loading point.

Because of the long-term storage of some of these service parts, the corrosion preventive is of the permanent film type. The solution consists of 50 per cent corrosion preventive and 50 per cent solvent. The purpose of the solvent is to speed the drying of the solution to a solid film so that the sleeve will be immediately ready for packing (without intermediate storage, where additional manipulations might cause damage). The tank is equipped with a bottom outlet for changing the solution when necessary, and piping is provided for adding corrosion preventive or solvent.

For safe removal of the units from the bath by mechanical means, a rigid-arm paddle wheel type unloader was devised. It consists of several vertical steel plates, each equipped with four unloading arms and mounted on a circular axis. Each arm is designed to give a cradling action as it revolves clockwise to scoop a sleeve from the oil bath and elevate and discharge over its head on the 10-inch wooden runway which feeds to a

## PACKAGING MECHANICS

cleated canvas booster type conveyor (see photos).

This short booster conveyor with its wooden cleats was incorporated when it was found that the ridges at the top of some of the sleeves caused these units to roll to the left or the right. Besides acting as a leveling and straightening device,

## Cut Costs in Your Shipping Room with



BEND-N-RAP combines the cushioned protection of corrugated with the speed and economy of wrapping paper. Flexible in any direction, BEND-N-RAP wraps and protects objects of any size, and shape with new speed—new economy.



USING BEND-N-RAP



USING ORDINARY PACKING MATERIALS

Compact rolls of BEND-N-RAP consume less space in storage than excelsior, shredded paper, etc. BEND-N-RAP consumes less space in the package, too—enabling you to pack more units to the carton or to decrease the size of the packed carton. More—BEND-N-RAP is cleaner, faster, easier to use.

**Used as an Outside Wrapper**

**BEND-N-RAP MAKES A FASTER, NEATER, SAFER PACKAGE**



USING BEND-N-RAP



USING ORDINARY PACKING MATERIALS

BEND-N-RAP saves time—no paper and twine are needed. BEND-N-RAP makes a smooth, neat package—the kind you'll be proud to have going out of your Shipping room. BEND-N-RAP gives your packages *corrugated cushion* protection.

GET THE COMPLETE  
COST-SAVING STORY →



**The AJAX  
Box Company**

2210 South Union Ave. • Chicago 16, Illinois

MAIL THIS COUPON TODAY

Please send me, without obligation, the cost-saving story of BEND-N-RAP, including speed-wrapping instructions.

NAME .....

FIRM .....

ADDRESS .....

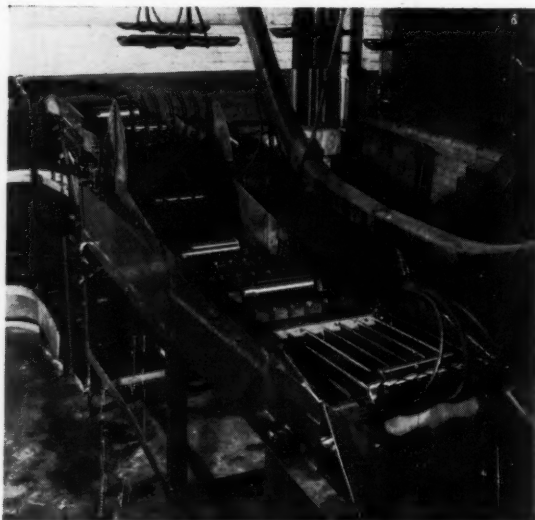
CITY ..... STATE .....

## PACKAGING MECHANICS

this conveyor also transfers the coated sleeves from the oiler to the drain conveyor.

### Pleated Belt Makes 90-Degree Turn

To make possible the packaging that follows as the next step, the draining conveyor was designed



THESE PISTON SLEEVES are automatically discharged from conveyor cradle to dip tank.

with features which are of particular interest. The units had to be conveyed with complete safety and, in addition, to drain off the excess solution before they reached the packing tables, located some 30 feet from the tank. The problem was complicated by the fact that its location required it to be designed with a 90-degree left turn. To accomplish this triple purpose, a combination cleated and pleated canvas belt and single-strand chain conveyor was devised. As can be seen from one of the photos, the word "pleated" is well justified because of the canvas folds or pleats that are formed between the wooden cleats.

Each cleat is attached to a rod which is mounted on an endless powered chain located beneath the belt, which rides in a semi-enclosed tubular runway. The single-strand chain supplies the motive power

and does not carry the load. To perform this function, a round steel rod is mounted on each side of the load-carrying belt. Sheet metal clips which ride on the rods are attached to the ends of the wooden cleats, which in turn are coupled to the pleated canvas belt. Thus the belt with its load is slid along on the supporting rods. This construction enables the belt line to

make the 90-degree turn. When the conveyor travels around the curve, the cleats come close together at one point and spread apart at the other, resembling a fan.

To speed up the draining of the corrosion preventive remaining on the piston sleeves, it was found that a 45-degree tilt of the parts was required. To accomplish this, the rod rails from which the conveyor belting is suspended are formed to give a high and a low level, as shown. The piston sleeves are thus properly tilted and at the same time securely held in place. Another point is that the sleeves in this position can be easily grasped. The excess solution dripping off during travel is caught in pans installed under the length of the belt, thus permitting salvage of the fluid and avoiding the hazard of slippery floors.

At the packing tables, adjacent to the line, up to three packers

may be stationed, depending on the volume of the material coming through. When operating at full capacity, the packing operation is broken down into the three following steps.

1. Set up the corrugated cartons and seal one end with glued tape. When the products being run through are for use on original equipment, this operator also sten-



DISENGAGED CRADLE is elevated while sleeves are dipped, transferred to drain conveyors.

cils the part number on the cartons. The stenciling and application of proper labels are important because of the large number of piston sleeves which are similar in size and are packed in containers of 12 different sizes. When the items are to be routed into the warehouse as spare parts, the stenciling operation is eliminated.

2. The second operation is to remove the piston sleeves from the pleated conveyor belt and wrap them in greaseproof waxed paper, which prevents the anti-corrosion film from being blotted off. This wrapping is also a "wall" between the part and the corrugated carton. The corrosion preventive, incidentally, is not entirely dry at this time, and the loading of the carton without this added protection would cause the corrugated paper board to deteriorate.

3. The third and last step is to

the  
ing  
full  
a is  
ow-  
ons  
pe.  
run  
nal  
en-

place the part into the set up carton, tape the end and affix two identification labels, one at the top and one at the side of each container. Because of the large amount of part numbers involved, the labels are printed without these numbers. The latter are then applied by means of an adjustable stamp which is set for each part number being run.

For rapid application of both gummed tape and gummed labels, two types of moistening and dispensing equipment are used. The first is for gummed tape in which the lengths of paper are stripped off through a fountain well for moistening. The label applicator moistens the labels as they pass over a revolving drum-type wetting roll.

The operator performing the final operation places the individual cartons into a box-type live skid if the units are destined for the parts warehouse. If the piston sleeves are to be shipped to original manufacturers, the individual cartons are placed in larger cardboard containers, up to 12 units per container.

The methods outlined here have been found to have the necessary degree of speed and flexibility for a peak production of 60,000 units per month—units that are similar but which come through in small lots of many different sizes and types. As explained in the beginning, the purpose of the entire set-up is to prepare the highly finished and fragile parts for packing shortly after dipping. The methods devised by engineers of Thompson Products Corp. have reduced a potentially complicated operation to a series of simple steps, involving mechanical transfer from conveyor to conveyor, with no manhandling from inspection through dipping to the packing stations.

#### STEEL STRAPPING FOLDER

"The Apex of Packaging Simplicity," a new four-page two-color folder issued by Gerrard Steel Strapping Co., discusses parcel post and light express shipments reinforced by bright copper-plated round steel strapping with the Gerrard TA Model Round Steel Strap-

ping Tool. The strapping reinforces the packages and bundles and makes them rigid and pilferproof. Packages thus strapped are acceptable by U. S. mails, according to the manufacturer. The coppered steel strap is applied by one easy forward and backward stroke of the tool's operating handle. The round strapping itself makes its own tight seal and requires no additional seals or crimping.

#### SIDE SEALER DATA

A folder containing data on the new A-B-C Automatic Side Sealer has been issued by A-B-C Packaging Machine Corp. The machine has been designed to seal both ends of long, narrow top-

## PACKAGING MECHANICS

heavy cases. It is equipped for handling all thicknesses of corrugated containers and heavy solid fiber cases. Adjustment for case size is done electrically. Glue pots are available to assure an even flow of glue. The machine is designed to handle up to 3600 cases per hour, according to the manufacturer.

#### MAGNETIC VIBRATORY PACKER

Syntron Co. has announced the addition to its line of paper joggers and vibratory packers of a new small model

*Outwears  
Regular Conveyors  
3 to 1*



*Sermat*

### ALL STEEL Flex-E-Unit \* STEEL BELT CONVEYOR

Heavy-gauge steel flights and chain are one integral unit—assures steadier, smoother action.

Carries double, even triple the load of conventional conveyors. Impervious to heat, resistant to acids. Exceptionally low in maintenance. Pays for itself in just a few months.

Special types available that can be tilted to speed assembly work. Standard links 3 in. or 6 in. pitch. Widths, 12", 18", 24", or 36". Other sizes on special order. Standard speed 30 ft. per minute. Others special.

## *Sermat* CONVEYOR CORP.

2346 W. 58th St.

Chicago 36, Ill.

Also

SERMAT SERVA-BELT  
PORTABLE CONVEYORS

SERMAT SPECIAL CONVEYORS

SERMAT MOBILE  
SERVA-SCOOPS

SERMAT OIL FURNACE

\*Reg. T.M. S.C.C., 1948 Pats. Pend.

SEND FOR COMPLETE  
INFORMATION TODAY!

Sermat, 2346 W. 58th St., Chicago 36, Ill.

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_





*it's no trick*

## To Apply Mathews Portable Conveyers

- For unloading cars and trucks, for speeding materials into storage and out again, and for piling and stacking, Mathews Wheel or Roller Conveyor lines, together with reversible portable Belt Conveyers, are a highly efficient combination. Important, too, is the fact that applying this equipment requires no special training. The Universal Couplings make all curves reversible, and the tripod type supports are easy to use and safe to adjust. There are no pinched fingers when using these locknut type stands.
- The Portable Belt Conveyers are strongly built and equipped with quality rubber-tired wheels. The conveyers can be easily and safely adjusted by one man.
- You can't beat this handling team. There is nearly a half century of experience behind Mathews portable equipment. It is designed right, built well, and readily available.
- Write today for complete information.



**MATHEWS CONVEYER COMPANY**  
ELLWOOD CITY, PENNSYLVANIA

**MATHEWS CONVEYER COMPANY WEST COAST**  
SAN CARLOS, CALIFORNIA

**MATHEWS CONVEYER COMPANY, LTD.**  
PORT HOPE, ONTARIO

*Engineering Offices or Sales Agencies in Principal American and Canadian Cities*

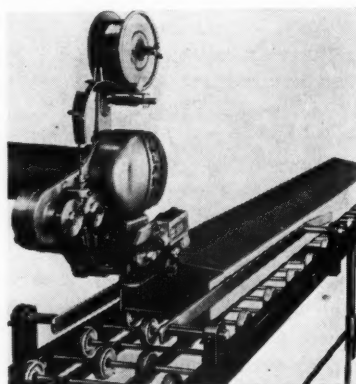
with built-in variable control power, a 7 inch by 10 inch wooden deck standing 4½ inches high and weighing 13 pounds. It is a portable piece of equipment that can be used by the printer for jogging 8½ inch by 11



inch sheets prior to cutting, feeding or binding; in large offices aligning quantities of invoices for filing and gathering sales and service manuals; for completely filling small phials, jars, cartons, or cans with bulk materials, or by dental laboratories for vibrating denture molds.

### TOP AND BOTTOM STITCHER

A NEW combination top and bottom stitcher has just been announced by the Inland Wire



Products Co. It eliminates the stitching post, and permits alternate stapling of tops and bottoms of cartons, both empty and filled, on the new Inland Speed-Flo Stitcher Shoe. It is adaptable to continuous conveyor production, with automatic stapler spacer that inserts staples uniformly without attention.

### POWDER FILLING MACHINE CATALOG

A NEW catalog detailing a complete line of powder filling machinery has been issued by the Harold W. Baker Co. Included are automatic, semi-automatic and manual fillers for the food, chemical, pharmaceutical and allied industries. The catalog contains photos, performance data and complete specifications for all equipment available.



# ANNOUNCING - -

## *The Second \$1500 Flow*

### COST ANALYSIS *Contest*

*More material handling engineers are given an opportunity to win substantial awards and to demonstrate the efficacy and economy of modern handling methods. Remember, the judges are not swayed by large savings; the important thing is to analyze them properly. See page 18.*

The second competition for papers explaining how reduction in production costs through the application of material handling and related equipment and systems has been accomplished was opened simultaneously with the listing of 1947 contest winners. Names of the winning contestants will be found on Page 18.

The new contest will close Nov. 15, 1948.

Eight prizes will be awarded. First prize is \$500; second, \$300; third, \$200, and the next five, \$100 each. In event of ties, duplicate awards will be made.

#### **Plant Employees Eligible**

Rules for the 1948 competition are the same as those applied to the papers just released by the judges. Manuscripts can be submitted by any employee or engineer or any concern except those generally known as manufacturers and distributors of material handling equipment. The contest is also closed to employees, or their relatives, of FLOW.

Manuscripts entered in the contest must describe the cost factors involved in any type of material handling installation. The entry may cover an entire plant or one specific department such as receiving, storage, processing or manufacturing, packaging, warehousing,

shipping and others.

Each entry must include a thorough description of the physical material handling installation. The cost analysis between the old and new handling methods must show clearly and definitely the actual savings realized with the modern methods and equipment. The formulae of the cost methods used to establish the analysis should be included.

Where the plant layout has been re-designed to provide for up-to-date material handling, details of the re-design should be stated along with advantages and other features over the old method.

#### **Savings Must Be Real**

It is important to remember that entries must cover savings and cost reduction resulting from material handling installations now in operation. Papers discussing proposed installations and estimated savings will not be considered by the judges.

Each manuscript should be accompanied by charts, graphs, tables, plant layout drawings, photographs and other supporting material as required to prove its case. All entries and material submitted become the property of FLOW and none will be returned to the contestants.

To be eligible for judging, each paper must be accompanied by an

official entry blank obtainable by writing to FLOW, 1240 Ontario St., Cleveland 13, Ohio. The identity of the entrant should be given on the entry blank and not on the actual manuscripts. The judges will be unaware of the author's identity since the entries will each be assigned a number.

#### **No Entry Limit**

Any number of different entries may be submitted by the same individual but each must have an official entry blank attached to it. All such manuscripts will be eligible for the awards on the same basis as any other entry conforming to the rules of the contest.

Judges for the contest will be selected from among the recognized authorities in the field of industrial material handling and production costs. The decision of the judges will be final.

Judging of the manuscripts will be conducted to determine the adequacy of the cost analysis and comparisons, efficiency of the present method of material handling over the former methods as revealed in the cost study, and technical accuracy and completeness of the entry.

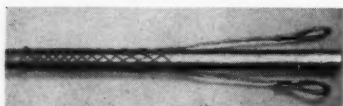
If the entry is an anonymous contribution, this fact should be stated by the author on the entry blank.



For additional information on these products, write Dept. 5, Flow Magazine, 1240 Ontario St., Cleveland 13.

#### WIRE ROPE GRIPS

**NP192**—Kellems Products, Inc., has announced a Wire Rope Grip for making temporary splices in wire ropes. Types are provided for



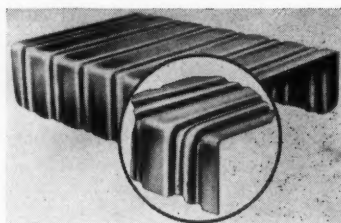
elevator, derrick, crane, rotary rig or any heavy construction equipment. Based on an old Chinese "finger trick," the grip applies even tension on all parts of the rope

with the hold tightening as the pull is increased. A swivel takes up the twist in the ropes. In most cases, it is unnecessary to remove the sheave block.

#### ALUMINUM SKID

**NP193**—Double corrugated one-piece skid platforms, made of aluminum, have just been announced by the Union Metal Mfg. Co. They are an addition to Union Metal's regular line of steel skids. Both types are made with the double corrugation feature, which consists

of two recessed corrugations joined by a raised center rib. Reports from the manufacturer indicate



that aluminum skid platforms resist corrosion in outdoor storage; are non-toxic and can be safely used for handling food products; resist most acids and sulphur compounds, and are non-sparking.

#### LIFT TRUCK

**NP194**—Revolvator Co. has introduced a new walk-along power lift truck called the Go-Getter. It is streamlined, self-contained, and measures 27½ inches between control handle and back of battery box. The Go-Getter has a single package hydraulic lift unit on

## ROL-AWAY

CUTS HANDLING COSTS ON  
AWKWARD ODD SHAPED LOADS

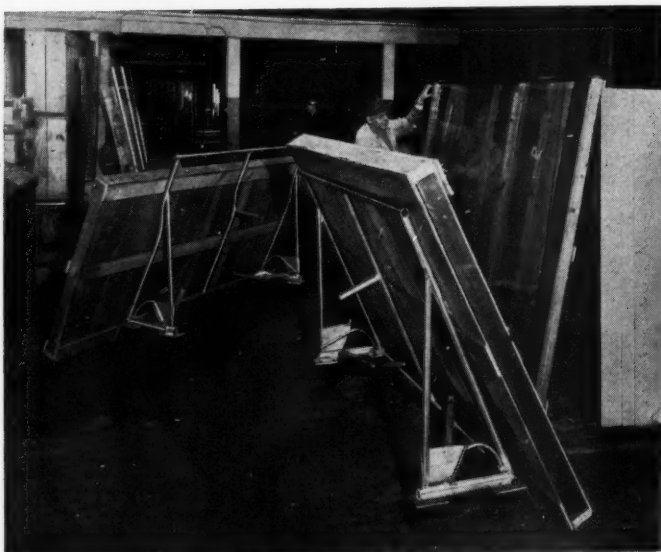
Rolaway does jobs that no other form of truck can do. A safe, easy way to handle sheet metal, plate glass, plywood, pipe, tubing, plaster board and large awkward cases of flat materials. Three models, made of aluminum tubing—light, compact and designed for easy one-man operation. Rol-Away is one of today's greatest labor savers and cost-cutters—pays for itself in a few days time.

- ★ Aluminum Construction
- ★ Weighs only 90 lbs.
- ★ 2400 and 3000 lb. capacity
- ★ Rolls in any direction

- ★ No lifting
- ★ Saves floor space
- ★ Safe . . . no slipping
- ★ Adjustable pipe rack



**BEAL PIPE AND TANK CORP.**  
1945 N. Columbia Blvd. Portland 3, Ore.



#### Send for Illustrated Folder

Gentlemen: Please send me free illustrated folder on Rolaway trucks.

Name .....

Firm .....

Address .....

City ..... State.....

which all adjustments can be made from the outside. For maintenance or repairs, the hydraulic or power unit can be removed from the body. The platform truck comes

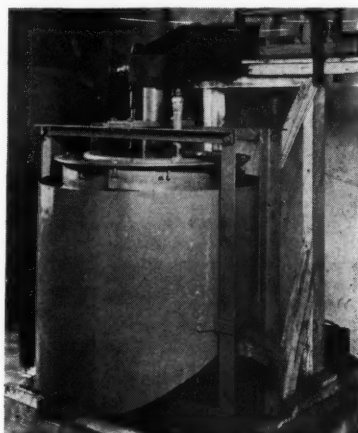


in 4000 and 6000 pound capacities and heights of seven, nine, or 11 inches. Lengths are available in 36 inches, 48 inches, 54 inches, 60 inches, 72 inches and over with 26½ inch width. The platform will raise a full four inches. Six inch height is available under certain conditions. An under-clearance of 3½ inches is provided to clear ramps or aprons. It operates on a six cell 13-plate battery which gives 8 hour operation. Front wheels are 12 x 3½ inches dual wheels with demountable rubber

tires. On the platform trucks the rear wheels have the same diameter as the lowered platform height. All wheels have molded rubber treads.

#### MAGNETIC SEPARATOR

NP195—Magnetic Engineering & Mfg. Co. has announced a new cone wet type continuous magnetic sep-



arator. It was designed for the concentration of finely divided magnetite ores, removal of magnetic

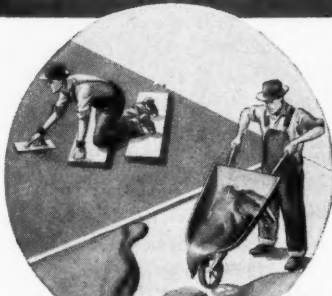
particles from cutting oils, the separation of minute iron particles in solution, and any other problem involving the separation of magnetic material from non-magnetic material, particularly when the material is extremely fine size. The new cone type magnetic separator operates continuously without any attention from the operator. The material to be separated, which is in solution with three or more parts of liquid to one part of solids, is fed to the top of the magnetic separator. The separation is made in the machine and the magnetic material is discharged from one outlet and the non-magnetic material discharged from the other outlet. The machine is built in sizes ranging from two feet in diameter to 10 feet in diameter, and in multiples from one to four stages of operation. A laboratory machine is available for test purposes.

#### SWEEPING MAGNET

NP196—A combination of a Stearns road sweeping magnet and a Dempster-Dumpster body receptacle for receiving the accumulated scrap metal picked up by the

## INDUSTRIAL TRUCKING FLOORS

Resurfaced to withstand any traffic...



**\$15.00**  
per unit  
Consists of:  
4—50 lb. Bags Powder  
5 Gals. Camcrete Liquid  
Coverage:  
100 sq. ft. about ¼" thick

### with CAMP'S No. 7 INDUSTRIAL FLOOR RESURFACER

Tougher than Steel—Easy to Apply

**COSTS ONLY \$15.00  
PER 100 SQUARE FEET**

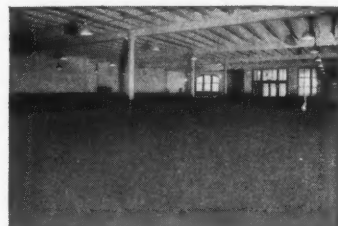
Camp's No. 7 is applied like cement over your present wood or concrete floors. A ¼ inch thickness resurfaces worn or rough concrete floors to withstand any traffic. Sets in three or four hours—ready for heavy trucking in 24 to 48 hours. Camp's No. 7 comes ready to mix—nothing else needed. Your choice of brown, red and natural dark gray.

Order a trial unit—you must agree it is the best resurfacer you have seen, or there will be no charge.

EVERY INSTALLATION UNCONDITIONALLY GUARANTEED  
Further information describing this and other Camp's flooring material sent on request.



Typical of Camp jobs is the recent application of almost 300,000 square feet of NO. 7 in a Marshall Field & Co. warehouse in Chicago. Users of Camp Flooring Materials include Illinois Bell Telephone, U. S. Rubber, Sears, Roebuck & Co., Carnegie-Illinois Steel, General Motors, American Can, etc.



Although NO. 7 is perfect for 90 per cent of all industrial needs, over 15 other Camp Flooring Materials enable us to meet even highly specialized specifications. Whatever your problem, we are ready to advise and assist. Write today. No obligation.

## The CAMP COMPANY

6958 S. State St., Chicago 21, Ill., Triangle 4770





magnet has been announced by Stearns Magnetic Separator Co. The rig consists of a Stearns 18" x 96" magnet used with a standard Dempster-Dumpster hoisting unit. The road sweeping magnet is detachable by removing two pins and the chains from a standard Dempster-Dumpster body. The proper height from the ground for using the magnet is adjusted by raising or lowering the boom of the Dempster-Dumpster unit. Electrical energy for the magnet is obtained

from a gasoline motored generator mounted on the side of the chassis and the current is controlled by a switch mounted conveniently for the driver.

#### FOLDING CONVEYOR

**NP197**—The National Engineering and Mfg. Co. has announced a conveyor that folds into a compact unit when not in use. An elevating conveyor, it is the pusher bar type. Standard lengths are available in 12, 14 and 16 feet. Specials are

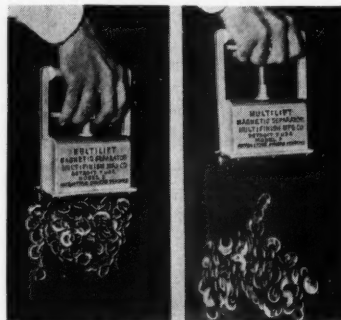
made up as required. The conveyor is hinged in the center so that it can be folded back into half of its



extended length. A 12-foot model will elevate nine feet at 45 degrees, according to the manufacturer. It has a cable elevating device with ratchet control. Drive is from motor to speed reducer to short chain. Speed is 75 f.p.m. The whole unit is mounted on swivel casters.

#### MAGNETIC SEPARATOR

**NP198**—A load-releasing, lightweight, adjustable hand magnet of the permanent (non-electric) type has been introduced for rapid handling of steel by the Multifinish Mfg. Co. Completely self-powered and requiring no current, wires or batteries, the unit is operated with one hand and lifts up to 15 pounds. It releases its load when a finger-tip lever is raised. Within the moisture-proof aluminum and stainless steel case are two four-inch Alnico magnets which, it is stated, will not lose power, regardless of kind or length of use. It requires no servicing and



has nothing to get out of order. Dimensions are 3" x 5 1/2" x 8"; weight 3 3/4 pounds. Known as the

*Specify* **DARNELL**



**CASTERS  
& E-Z ROLL  
WHEELS**

**For Savings, Service  
Safety and Speed—  
Demand Darnell  
Dependability. A  
caster or wheel for  
every industrial use**



**This FREE Book  
points the way to  
greater savings.**

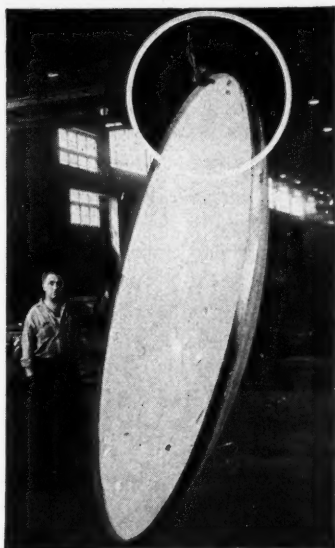
DARNELL CORP. LTD. 60 WALKER ST. NEW YORK 13 N.Y.  
LONG BEACH 4 CALIFORNIA 36 N. CLINTON CHICAGO 6 ILL.



**Multilift Model S Magnetic Separator**, the magnet has been designed, according to the manufacturers, for drawing steel parts from tumbling media; handling nuts, bolts, screws, nails and small parts; separating stacked steel strips; removing heat-treated parts from carbon; handling hot or cold parts; separating steel from non-ferrous materials of many kinds such as brass, chemicals, foods, fibres; and in salvaging steel parts or particles from aisles, assembly lines, etc.

#### GRIP CLAMP

**NP199**—A device for raising or lifting into place such items as large tanks, flanged heads, and similar articles which are usually difficult to get securely attached, has been

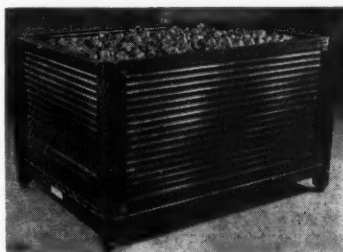


announced by Merrill Brothers. It is designed to lift anything that has sufficient flat surface for its jaws to grip. It is made in the following sizes: one-half ton, one ton, three tons and six tons.

#### STACKING BOX-PALLETS

**NP200**—Equipment Mfg., Inc., is introducing a material handling device known as Multi-Box, a container of varied uses because the side panels are removable so that it becomes a rack. The ends in turn are also removable so that the bottom section can be used alone as a pallet. The pallet frame, legs and end frame posts are made from heavy gauge square tubing to pro-

vide support during tiering. Side and end panels can be made from

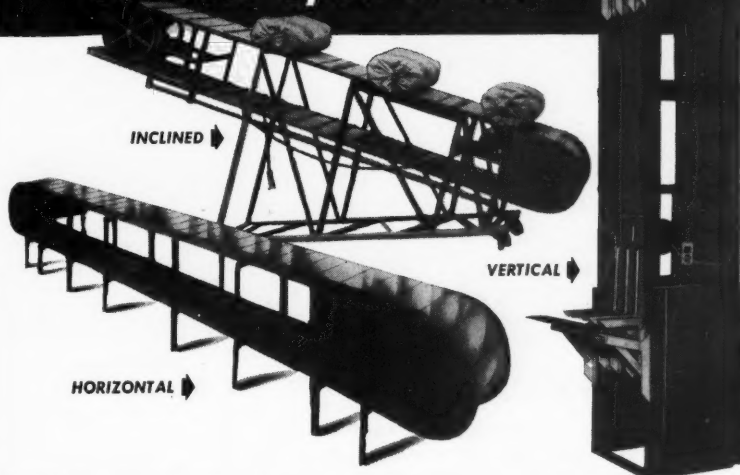


any gauge corrugated sheets or

wire mesh. The side panels are inserted and removed by means of bayonet sockets. The end frames have telescoping post extensions that slide in and out of the pallet legs. Nesting caps are welded to the bottom of pallet legs to facilitate tiering.

**REVERSIBLE ROLLER CONVEYOR NP201**—Island Equipment Corp. has developed a two-in-one Portable Roller Gravity Conveyor. One side, with the rollers set high above the side rails allows handling of

## STEEL PARTS STEEL BELT CONVEYORS PRE-ENGINEERED for Your Specific Job



**PRE-ENGINEERING** makes Steel Parts steel belt conveyors easy to install, operate and maintain — and their flexibility suits them to your specific job. Whether you're installing a single conveyor or an entire system, consider the cost-saving advantages of steel belt conveyors — a flat, sagless surface of steel, easy to clean, sturdy and rugged. Write for details today.

**Certain choice territory still open.**  
Qualified representatives are invited to write for information.

#### Here's What Steel Belt Conveyors Did for One User

1. Production efficiency UP 30%.
2. Unit cost DOWN 10%.
3. Machine capacities UP 65 to 95%.
4. Operating space CUT 58%.
5. Waste REDUCED by 5%.

#### GET THE COMPLETE STORY Mail This Coupon Today

STEEL-PARTS MFG. CO.  
2145. Morgan St., Chicago, Ill.

Please send me complete information including engineering data and specifications on your Steel Belt Conveyors.

Please have your representative call to discuss our specific materials handling problems.

NAME \_\_\_\_\_ POSITION \_\_\_\_\_

FIRM \_\_\_\_\_ ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_

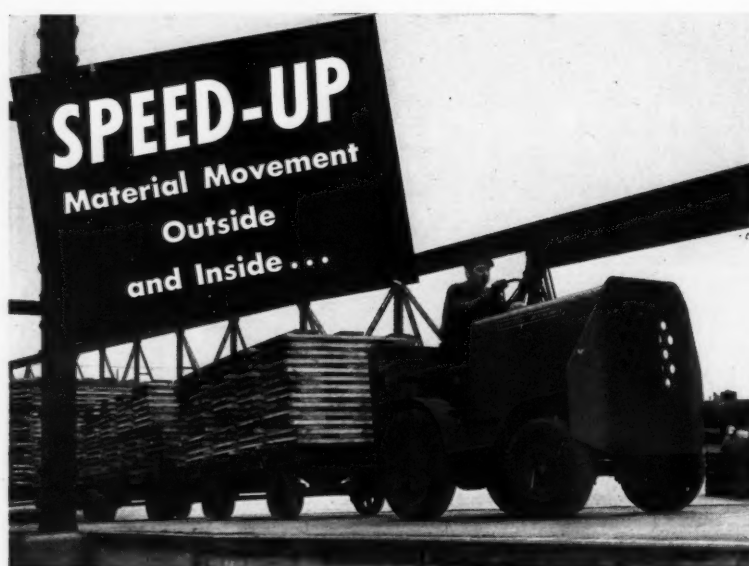
**STEEL-PARTS**  
**MANUFACTURING CO.**  
DIVISION OF BLACKSTONE  
MANUFACTURING COMPANY

packages or parts that are wider than the frame. The other side of the conveyor, having the rollers sunk below the level of the side rails, permits conveying items smaller than the distance between the two rails. An operator can turn the conveyor over for the type of work to be handled. With the rollers in high position, cartons and cases up to 24 inches wide can be carried. When inverted with rollers in low position, small car-

tons, cases, rolls of paper, kegs, etc., can be carried. The legs are supplied in double post type, with adjustable height units varying from 12 inches to 72 inches. Sections are 10 feet long and 90 degree curves; widths, inside frame  $14\frac{3}{4}$  or  $16\frac{3}{4}$  inches, rollers, two inches diameter x 16 gage with roll ends set on four inch centers.

**PUSH-PULL ATTACHMENT NP202**—A new Pul-Pac attachment for Clark Tractor for

trucks was shown at the Second National Material Handling Exposition. The "push-pull" device, introduced at the 1947 show in experimental form, has since been subjected to tests in several warehouses and manufacturing plants. Several refinements and improvements have been incorporated in the model now in production. The attachment handles a unit load assembled on a base sheet of corrugated paper, fibre board or similar material either disposable or dur-



Plus-Power and great maneuverability of **SHOP MULE** tractors have earned their title of "America's Most Versatile Industrial Tractor." It's a general purpose unit for almost any size factory, yard, utility or transportation requirement and accommodates numerous equipment adaptations. Powered by International Harvester 30.5 H.P. engine, full pneumatic tired, turning on 90° radius, it's exactly right—and priced right too. Parts and service world-wide.

**CONDENSED SPECIFICATIONS A14V MODEL SHOP MULE**  
 Engine—International U4-30.5 brake horsepower at 1650 RPM. Four cylinder  $3\frac{3}{8}$ " bore,  $4\frac{1}{4}$ " stroke. Clutch and Transmission—IHC 10" single plate, dry disc heavy duty clutch. Selective sliding gear transmission, 3 forward speeds,  $3\frac{3}{4}$ , 8, 14 MPH, one reverse speed 3 MPH. Wheels and Tires—Two piece cast front wheels, 6.00x9—4 ply pneumatic tires. All wheels on tapered roller bearings. Chassis—Heavy steel front axle, forged knuckles and arms, cam and lever steering gear. Structural steel frame,  $\frac{3}{8}$ " steel plate front and rear bumpers. Length, overall less coupler—80". Width, overall—42". Shipping Weight—3000 lbs. Coupler—Pin and loop type is standard. Minimum Turning Radius—90". Height over steering wheel—59"; over cowl 47". Wheel base—46 $\frac{3}{4}$ ". Maximum Drawbar—2400 lbs.



**W. F. HEBARD & CO.**  
 CHICAGO 16, ILLINOIS



able in nature. A hydraulically actuated vertical sliding rack travels horizontally above the truck's wide load plates, and a clamping device at the bottom of the rack grips the projecting edge of the carrier sheet while the load is pulled onto the load-plate. At destination, the rack is moved forward, pushing the load off the load-plate in the desired position. Lifting, tilting and lowering are done in the usual manner.

## TWO-WHEEL TRUCK

**NP203**—Lewis-Shepard Products, Inc., has announced a two-wheel hand truck with double position wheel centers which can be locked in either forward or retracted position for loading or transporting. The all-steel device has been designed for moving soft drink coolers and other similar loads. The frame is structural steel and the tubular steel handles are equipped with reinforced felt padding over their entire length to prevent scratching or damage to the load. The truck also has an adjustable holding strap to keep the load in position during transit. Wheels run on roller bearings and carry 10

CREATORS AND MANUFACTURERS OF SHOP MULES SINCE 1918

\*\*\*

**At Last!**  
**A Clamp Drop Forged Throughout, No Welding - No Springs**

**MERRILL-VOLZ  
 FLAT SURFACE DROP FORGED  
 ALL STEEL CLAMP**

The Clamp designed for gripping any and all flat surface objects in absolute safety.

Used on hoists, cranes and all lifting equipment.

**MERRILL** *Brothers*  
56-20 Arnold Avenue Maspeth, N. Y.

**FEBRUARY, 1948**

**MATERIALS HANDLING EXPERTS**

**MATERIALS HANDLING**  
**at CLEVELAND SHOW** **AGREED** that the **MOTO-TRUC**  
has more new features  
than any other truck  
of its type

No other truck of this type has as simple, easy or convenient control.

Easy grip roller type handle.

**No other truck of this type has as simple, easy or convenient control.**

**Easy grip roller type handle.**

**Two speeds forward and two reverse by a twist of the wrist.**

**Push buttons in the ends of handle control hydraulic lifting and lowering.**

**Shorter overall length, up to 11", permits easier operation in narrower aisles, etc.**

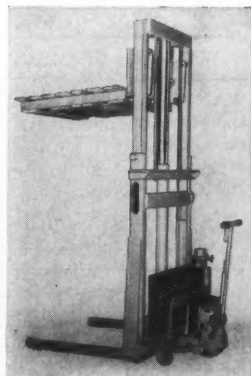
**Lower line of gravity—no tipping over, and many more exclusive features.**

**Write for  
BULLETIN  
No. 47-A**

**The Moto-Truc Co.**  
1953 E. 59th Street  
Cleveland 3, Ohio



### 12-Volt Platform Truck



## 12-Volt Telescopic Hi-Lift Truck

## Originators of Motorized Hand Lift Trucks

# PALLETS

**THE UNIT SYSTEM OF HANDLING AND WAREHOUSING MATERIALS**

## Pallets Pay Dividends

methods, instead of handling them individually packages are grouped on pallets. These pallet units are handled mainly by pallet trucks, fork trucks and cranes. Duplicate handling of single packages is eliminated with the following advantages: loading and unloading operations are accelerated by factor of 3 to 4 or more; storing and warehouse space is multiplied by nesting pallet units right up to the ceiling; floor space is kept clear for production equipment; potential pilferage and damage to individual packages is greatly reduced; inventory control is simplified.

Today large and small businesses realize they must pollinate to keep their prices on a competitive basis. A large automobile company recently spent \$200,000 to develop pollination methods for its new car line throughout the United States.



INDUSTRIAL PALLET CO., INC.

**PALLETS EXCLUSIVELY SINCE 1943**  
1013A Westworth Bldg., New York 7, N. Y.  
Telephone: BRADley 7-0000-7

***SEND for this  
new materials-  
handling bulle-  
tin—advises how  
to cut your  
operating costs.***

## INQUIRIES INVITED

**The IPCO representative is a materials-handling engineer. Consult him on your palletization problems...no obligation!**

INDUSTRIAL PALLET CO., INC.

PALLETS EXCLUSIVELY SINCE 194

1616 WOOLWORTH BLDG., NEW YORK 7, N. Y.

Telephone BArelay 7-8446-7



# OPPORTUNITIES

*Men wanted    Jobs wanted    Lines available*

Rates: for "Positions Wanted" \$3.50 minimum, limit 25 words. For all other classifications \$3.50 minimum for 25 words, each additional word 10c; bold-face type or all capitals, \$6.00 minimum for 25 words, each additional word 15c; limit 50 words. Box addresses count as five words. All insertions are payable in advance.

## WANTED—REPRESENTATION

WANTED: Sales Representation. We manufacture high quality OAK pallets, skids, etc., from timber stand to finished product—to customer's specifications. Write:

BATH WOOD PRODUCTS CO.  
OWINGSVILLE, KENTUCKY

## REPRESENTATIVE WANTED

Manufacturer of nationally advertised line of equipment and supplies wants manufacturer's representative for a number of exclusive areas. Fast moving, good repeat business. Representative must contact shipping departments. A good opportunity for the right man to secure a permanent and exclusive

line. Write stating number and type of lines now sold. F. X. Spalding, 7358 North Seeley Ave., Chicago 45, Ill.

## POSITION WANTED

Materials Handling and Plant Layout Engineer—Experienced in Industrial Truck Operation, Conveyors, Palletizing, Warehousing, and a large variety of factory handling equipment. Desires position with a manufacturing concern that can offer a future. Box 2248.

SALES ENGINEER: many years experience in conveyors, machinery, specialties. Experienced executive. Well qualified to handle New York office for manufacturer. Box 2348.

## NEW LINES WANTED

MANUFACTURERS' REPRESENTATIVE ATLANTA, GEORGIA TERRITORY WITH LARGE FOLLOWING AND TWENTY YEARS EXPERIENCE IN MATERIAL HANDLING SYSTEMS DESIRES ADDITIONAL LINES, ESPECIALLY INTERESTED IN A FORK LIFT TRUCK ACCOUNT BOTH GAS AND ELECTRIC, MAINTAIN WAREHOUSE AND SERVICE FACILITIES, CAN GUARANTEE GOOD COVERAGE GEORGIA, NORTHERN FLORIDA AND SOUTHERN TIP OF SOUTH CAROLINA. BOX 2148.

## HELP WANTED

NATIONALLY KNOWN MANUFACTURER OF MATERIALS HANDLING EQUIPMENT WANTS ALERT SALES PROMOTION MAN TO CONTACT AND AID DEALERS IN WIDE-SPREAD TERRITORY. PRODUCT HAS SUPERIOR ADVANTAGES—OFFERS UNLIMITED OPPORTUNITIES. SALES EXPERIENCE NECESSARY. ENGINEERING BACKGROUND HELPFUL. BOX 2148, FLOW.

## EXPORT LINES WANTED

Export Department of firm specializing in sale of Materials Handling Equipment wants additional lines. Will act as export department for manufacturers. Experience in domestic and foreign sales.

## INDUSTRIAL EQUIPMENT DIVISION

International Worldmarket, Inc.  
16 Court St. Brooklyn, N. Y.

## USED EQUIPMENT

"USED BUTLER BIN CARSCOOP—electric powered, Hydro Reel and cable. Write us for further information.

Price \$695.00

Aug. Brandt Tractor Co.  
Appleton, Wisconsin."

## LUMBER FOR SALE

WOULD LIKE TO QUOTE ON PALLET STOCK CUT TO LENGTH OUT OF DRY SOUTHERN HARDWOODS. CAN FURNISH BOTH STRINGERS AND DECKBOARDS. WRITE FOR PRICES. BOX 2448.

## RE-BO

THE PATENTED  
**REMOVABLE BODY**  
FOR 2-WHEEL TRUCKS



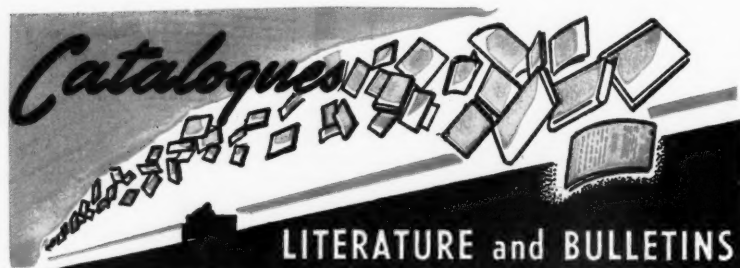
Speeds handling of cartons, package freight and bags. Doubles the efficiency of two-wheel hand trucks by increasing the size of the load. Reduces re-handling, eliminates delay to truckers waiting. Speeds up service. Fits all two wheel hand trucks.



HANDLING MORE GOODS AT LESS COST

## RE-BO

MANUFACTURING CO. INC.  
331 Madison Ave. New York 17



The publications featured on these pages were written by experts. They are **FREE** publications. To obtain these use the postcard bound into this issue.

**443—Bulk Handling . . .** A 48-page bulletin illustrating and describing various designs of bulk handling systems, including separated and combined runs, their salient features, and typical installations for various industries has been published by Link-Belt Co. It contains several pages of charts and other engineering data.

**444—Overhead Conveyors . . .** Beverage Millwright Service, Inc. has issued a six-page bulletin describing Keystone Junior Conveyors for light duty handling and overhead storage. It also includes de-

tails of typical applications and engineering data.

**445—Power Plants . . .** "Power Points," an illustrated 18-page booklet intended for engineers, equipment designers, and manufacturers with engine application problems, has been issued by D. W. Onan & Sons, Inc. It illustrates and explains the use of a new 10-horsepower engine for use in small tractors, conveyors, pumping units, plows, welders, etc.

**446—Magnesium Ramps . . .** A bulletin describing Penco medium duty ramps, having a capacity of 6000 pounds, has been



issued by Pallet Engineering Co. It provides important engineering data to help the user select the correct type of equipment.

**447—Pallets . . .** National Pallet Corp. is distributing an eight-page illustrated brochure giving general data, including construction features, size, varieties and load limits, of its line of wood pallets.

**448—Crane Catalog . . .** Wayne Crane Division, American Steel Dredge Co., Inc. has issued a 20-page illustrated catalog describing a one-man operated, rubber-tired machine serving as a five-ton crane, and ½ yard clamshell, dragline, power shovel or trench hoe. Two booms and attachments are interchangeable. The book gives complete operating and specification data.

**449—Gear Catalog . . .** Falk Corporation has released its new bulletin giving descriptions and illustrations of all Falk precision products, such as, gears, speed reducers, Motoreducers, couplings, high speed drives, backstops, marine drives and special gear drives. Available services and facilities including steel casting, machining weldments and engineering are also described.

**450—Magnetic Tool Catalog . . .** Syntron Co. has announced availability of a new 92-page catalog, profusely illustrated, describing its complete line of vibratory material handling equipment, including electromagnetic vibrators, packers, vibratory feeders, dry feeder machines, weighing feeders, etc., and construction and maintenance tools.

**451—Film Catalog . . .** A 24-page booklet giving complete descriptions of Westinghouse sound motion pictures and slide films available for industrial and civic use, by the Westinghouse Electric Corp. Four-colored and twelve black and white sound movies, plus eight black and white slide films are loaned free except for cost of transportation. Subjects covered include: electronics, electricity, radio, RF heating, research, industrial maintenance, safety, vitamins, and nutrition.

**452—Rubber Stamps . . .** A catalog of rubber stamps and stamping equipment is offered by Acme Marking Equipment Co. The 88-page publication is printed in two colors and includes descriptions of date and time stampers, numberers, signature stamps, and rotary printing wheels.

**442—Pallets . . .** Midwest Pallet Corp. has issued a bulletin describing double faced, single faced and cargo pallets. It describes construction features of the wood equipment.

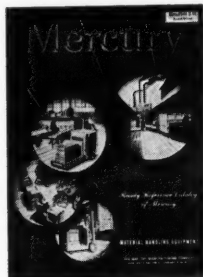
**443—Floor Resurfacer . . .** Stonhard Co. has published a large folder describing heavy-duty material for repairs and overlays to concrete and wood floors. Illustrations show several typical installations which solved floor problems for a variety of industries.

**444—Steel Strapping . . .** A new two color issue of Process News, published by Acme Steel Co. is ready for shippers who are interested in various uses of steel strapping. Washboards, venetian blinds, reel lags, motors, bolts, bees, shampoo are a few of the products featured in this issue.

**445—Fork Truck . . .** A six page bulletin issued by Crescent Truck Co. illustrates and describes the new Crescent

## TRACTOR-TRAILER-TRUCK REFERENCE CATALOG

Second edition of the Ready Reference Catalog of Tractors, Trailers, Lift



Trucks and accessories, published by Mercury Mfg. Co., is now available to readers of FLOW. Divided into five sections, the book discusses and illustrates advantages

and applications of the "trackless train," fork truck, platform lift and load carrying truck systems of material handling. The fifth section explains various power sources and charging equipment. Factors in the selection of a system and specifications of equipment are included. Write to FLOW for your copy.

Electric Palletier Model MGVH in 3000 and 4000 pound capacities. It includes charts of load lengths for each capacity, dimensional drawings and complete specifications.

## LANHAM FOR LIFETIME THE STEEL BOUND SKID PLATFORM



with the  
**RE-NU TOP**

Renewable hardwood deck bound in heavy steel angles, clamped with ½" steel bolts. Can be used with all makes hand or power lift trucks. Designed to fit YOUR job with capacities from 500 to 20,000 pounds. Plain or armored ends. Stake pockets, crane hooks, special racks and bins available.

## THE LANHAM COMPANY

12TH AND MAGNOLIA  
LOUISVILLE 10, KENTUCKY



This EUCLID CLAIM is substantiated by successive repeat orders for Euclid Cranes from steel plants, automotive factories and rolling mills which include an impressive list of the big leaders in the heavy industries.

**THE EUCLID CRANE & HOIST COMPANY**  
1362 CHARDON ROAD, EUCLID, OHIO

WRITE FOR  
YOUR COPY OF  
THE LATEST  
CRANE CATALOG



a Material Handling  
Exposition Digest  
presented for the thousands  
who could not attend

# PROCEDURE FOR MAKING A MATERIAL HANDLING SURVEY



**By A. E. Auken**  
Material Handling Consultant  
Bay Village, Ohio

**W**HEN a board of directors or a factory manager decides to explore the cost-reducing possibilities in materials handling, someone will be singled out to conduct a Survey and to bring in recommendations for their consideration. The man who receives the assignment may be an engineer already engaged in the manufacturing organization, or he may be a consultant who has specialized in this sort of work in a variety of industries.

Following are the suggested steps which the engineer may use to plan his course of action.

## **Establishing the Scope of the Survey**

The first and most important step to take is to determine the extent to which management will respond to the recommended changes. Obviously, the survey will be a failure if it is based on a program of new construction, after the owners have clamped down the lid on building expansions. The same reasoning applies to moving the facilities to another building.

Management should also be sounded out on its reactions to the costs of carrying out the recom-

*Plan for getting at all the facts needed for effective cost reduction. Other papers presented at the second National Material Handling Exposition will be presented in the March issue.*

mendations that may be offered. This will be not only a determination of available funds, but also a statement of what portion of the expenditures may be for capital goods. The materials handling engineer should get statements on these matters, at least to the extent of determining the course and limits of his project.

It is well to establish early whether the survey is meant to cover only one or a few of the processes and departments, or whether it is to be plant-wide, from the receiving dock to the shipping platform, or more correctly, from the supplier's plant to the consumer's dock.

The question of whether management is willing to relocate machinery and entire departments should be brought up in the early stages, as plant layout often is a vital part of the solution to material handling problems.

Having set the limits of his project, the engineer is then in a position to begin the task of observing and recording the concrete facts that will guide his judgment toward the final recommendations.

## **Determining the Physical Limits**

Every building has definite physical characteristics that govern its utility for manufacturing or warehousing purposes. The location of the structure, its size and its

shape, the condition and strength of its floors and walls, the location, size and style of its freight docks, the location, size and capacity of its freight elevators, are all factors to be noted.

Buildings with multiple floors present problems in vertical transportation and low floor loading capacities. The load limitations on upper floors very definitely affect the materials handling system, by demanding the assignment of only the lighter production equipment to those levels, and by setting low limits on the weight of load units and conveyances. The factor of multiple levels demands that the equipment for horizontal movements be integrated with the equipment for vertical movements, or that the handling equipment be of a type that will serve in vertical as well as horizontal movements. These are a few among other points to be considered.

A drawing of the floor plan of the complete plant should be obtained or prepared, and the physical limits and anchor points should be marked in their true positions. This layout drawing will be useful in studies of the paths of flow and in the selection or specification of the materials handling system.

## **Anticipating the Production**

After the scope and physical limits have been established, and be-

fore a detailed study is made of material flow, an estimate of the kind and amount of production for the next one to three years should be obtained. An estimate of this sort may be like a shot in the dark, but the survey is concerned with the future, and coming events can only be approximated.

Even in jobbing production, management has a fair idea of what may be expected in the near future. Sales Departments are in constant touch with users, and have reasonably accurate ideas of what the demands of the market will be.

The surveying engineer must know of any expansion plans that are under way, of any new products and new models that will be injected, and of any new processes that will be used. A knowledge of such possible changes will allow the engineer to prepare alternate recommendations, one to suit if the new work is handled, and the other to apply if no expansion is to take place. Seasonal items are another consideration.

If the seasonal product is manufactured on a 12-month basis, the space and handling equipment requirements at the machines will be lessened, but considerable space must be allocated in finished goods stores for accumulating the products until the season for shipments arrives.

#### Selecting the Predominating Items

The material handling problems in any industry are numerous, and no one type of handling machinery will perfectly suit all of the major demands. Nor can it be expected that even several types of handling machinery, integrated into an efficient system, can suit some of the minor demands while fulfilling all of the major requirements.

The items and constituents having the greatest handling demands can be identified by examination of the finished products and through a simple analysis of the processes employed in their production.

In general, the characteristics of a material that determine its handling demand are weight, quantity,

## FLOOR TRUCKS

### STANDARD AND SPECIAL



WHEELS: Metal - Rubber - Pneumatic



### SPECIALS OUR SPECIALTY



We take pride in our product and guarantee satisfactory performance and sturdy, long time operation under the most severe use. Agencies in most principal cities. Catalog gladly furnished upon request. Repeat orders testify to the efficiency of our trucks.

MAIN OFFICE AND FACTORY

**ORANGEVILLE MFG. CO.**

"Established 1879"

ORANGEVILLE 1, PENNA.

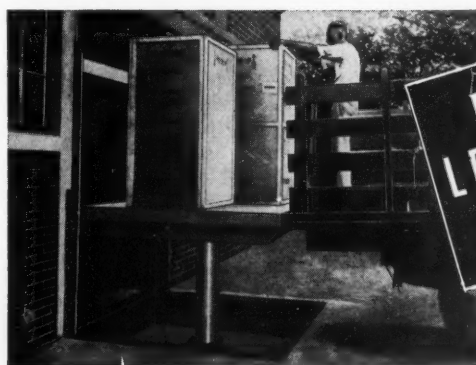


NEW CATALOG SHOWS HOW TO

*Lift Loads Faster!*

Write now for new Rotary Catalog RE-202. It shows how to slash labor costs by using Levelator Lifts for loading and unloading jobs . . . and for feeding and receiving materials from presses, shears, etc. Levelator car rises quickly and

smoothly as oil is forced into powerful hydraulic jack by simple electric pumping mechanism or compressed air. Operation safe, dependable, economical. Installation simple. And you can get prompt delivery now for the first time in 7 years.

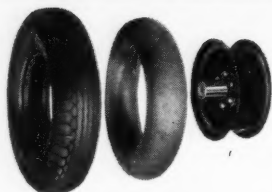


ROTARY LIFT CO.  
1150 Kansas  
Memphis 2, Tenn.



## Manufacturers!

WE CAN  
FURNISH YOUR  
INDUSTRIAL WHEELS



Let us figure with you on your requirements. Complete satisfaction and prompt service guaranteed. Our specialty is the manufacture of industrial wheels in the following sizes: 6 x 2", 8 x 1", 10 x 2.75, 12 x 3.00 and 4.00 x 8.

All wheels are equipped with highest quality ball or roller bearings and tires are solid or pneumatic with tubes.

SEND FOR FULL  
INFORMATION

**CITY MACHINE CO.**  
1095 HOME AVE.  
AKRON 10, OHIO

## Why ENGINEERED DESIGN PALLET?

The selection of the proper pallet is the most important single step in the development of a fork truck-pallet system. The correct choice of fork truck can be made only after all details of pallet size, load and weight are known.

ENGINEERED DESIGN will insure the success of your entire installation by making that most important initial step a judicious one.

**Pallets Incorporated**

Manufacturers of  
**ENGINEERED DESIGN Pallets**  
GLEN FALLS, N. Y.

size, shape, fragility and perishability. In a secondary manner, the number of operations performed on a part will increase its handling demand beyond that which is indicated by its size, quantity or weight.

Indirect materials, which do not end up as parts or constituents of the finished goods, should not be overlooked. Sand in a foundry is a good example of an indirect material of major proportions.

When the dominant items and materials are established, specific data should be obtained on each, such as its weight per cubic foot, the sources of supply, the size of lots received, the type and size of transporting containers, the degree of inspection required at receiving, etc.

### Estimating Cost of Present Handling Methods

Having singled out the major parts and materials, the surveying engineer next estimates the cost of handling these items with the present methods and on the proposed production schedule.

A flow chart is prepared for each of the selected materials, and each handling operation performed on the material is listed in sequence from receiving to the point where it is placed into a sub-assembly or into the final product. The time required to perform each listed operation is marked opposite the description, and is stated in decimals of hours. The number of units handled in the time stated, and the number of men engaged in the operation should be shown, as the figures must be extended to indicate the man-hours expended on each piece.

Synthetic standards may be set up, in the absence of real time study data, for the time consumed in each handling and moving element. If the synthetic standards are reasonably good estimates and are applied equally to all cases, the resulting cost figures will be quite reliable.

Processing operations, and the time consumed in performing them,

## Special Equipment

FOR THE EFFICIENCY OF YOUR  
MATERIALS HANDLING



Designed and built to your specific needs, Fab-Weld all-steel equipment means top economy, strength and durability. Trucks, dump hoppers, skids, racks and bin boxes are examples of Fab-Weld geared-to-the-job engineering.

Write our Materials Handling Division for full details. Representatives in all principal cities.

**FAB-WELD**  
CORPORATION

RICHMOND STREET at PICKWICK  
PHILADELPHIA 34, PA.



### STORE TO the CEILING with the HANDIPILER

Reach to 12 ft. above the floor and stack to 14 or 16 ft. with the Handipiler. Handles boxes, bags and cartons up to 100 lbs. in weight. Compact, light in weight—readily wheeled into confined spaces. Saves lifting—carrying—cuts handling time in half; users report savings of 8 to 10 man-hours in handling time on many jobs. Reversible belt movement, adjustable boom and floor locks are standard equipment. Operates from any convenient lighting circuit outlet.

Write for Bulletin No. FL-28 today!

**STANDARD**  
CONVEYORS

Sales and Service in  
All Principal Cities  
STANDARD CONVEYOR COMPANY  
General Offices: North St. Paul 9, Minn.



are excluded from the flow chart, as they are not factors in the cost of handling. Usually, the element of handling that is included in the standard time for a processing operation can be omitted also. This presumes that the processing operator will not be inconvenienced or inconvenienced by a change in methods of materials handling between operations. However, in cases where alternate methods will change the standard time for a productive operation, a separate study may be made to evaluate the difference.

The next move is to apply the proposed production figures, on a monthly basis, to the handling time estimated for each piece. This gives the total man-hours expended each month on each of the materials considered. Man-hour totals can be converted to cost in dollars by applying a suitable wage rate and burden.

#### Applying the Principles of Efficient Handling

With the completed flow charts, and the other data collected ear-

lier in the survey, the engineer has a concise picture of his project, and in a form suitable for the application of the principles of efficiency in material handling.

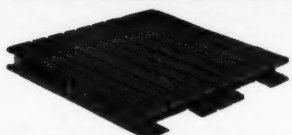
Examination of these data will show where the greatest man-hour or dollar savings can be effected, and where changes in layout will eliminate some of the handling and moving elements. They will suggest the utilities that should be provided by the handling equipment, and will provide a basis for comparison of alternate methods from the standpoint of cost savings.

In addition to these indications, the facts and figures will provide data for estimating the areas needed for stores, of space required for banks ahead of certain operations, and of the numbers of containers and conveyances required for storage and movement of goods.

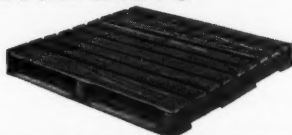
The application of each principle of efficiency in material handling can be evaluated by cost and volume summations. The various modes of handling and conveying (Turn to page 65)

**PROMPT SHIPMENT AT LOWEST PRICES ON ANY PALLET**

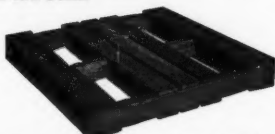
**ORDER FROM 1 CAR to 100 CARS!**



No. 1—Stavedors of Cargo Pallet. Non-reversible, double-faced, with over-hanging deck boards to permit use with sling.



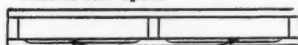
No. 2—Standard Double-Faced Non-Reversible Pallet. Slatted deck design. Bottom boards are spaced to permit entry and elevation by either hand-truck or electric fork trucks.



No. 3—Reversible Double-Faced Pallet. Both upper and lower deck boards are spaced to permit entry of pallet trucks.

Continuous repeat orders from many of the largest industries prove beyond a doubt that the **OZARK MASTER PALLET** is the master of all Hardwood Pallets. Constructed of the Ozark Hardwoods, expertly manufactured, holes predilled to eliminate splits, entry boards chamfered for easy entry of wheels. Four Ways, Eight Ways, Standards, Light and Soft Woods. Write, Wire or Phone your requirements. Prompt Shipments.

**Representatives Wanted!**  
Attractive commissions can be earned by our sales agents. Get our proposition. Many good territories still open.



CHAMFER END BOARDS FOR EASY TRUCK ENTRY

**OZARK PALLET COMPANY**

P. O. BOX 63,

BERGMAN, ARK.

PHONE L. D.

**HALL O'WELL**

## TRUCKS of STEEL



Fig. 753  
4-Wooden-Stakes



Fig. 760  
1-Bar Handle



Fig. 757  
2-Bar Handles

**... BUILT TO TAKE GRUELLING PUNISHMENT FOR YEARS**

... and with minimum maintenance and repair. This sturdy, welded, splinter-proof construction insures against weak, loose joints, wobbly trucks and rapid wear ... casters with free-rolling wheels make the "Hallowell" run easily, even under heavy loads. Types and styles—each a model of smooth-running durability—are available for every service. Write for your copy of the "Hallowell" Catalog, it describes them all.



Fig. 762  
2-Pipe Stakes



Fig. 751  
4-Pipe Stakes



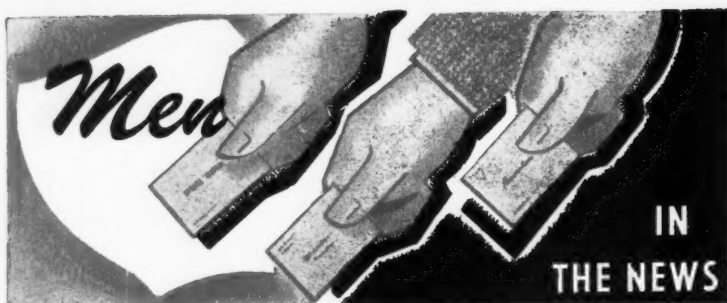
Fig. 772  
1 Rack

OVER 45 YEARS IN BUSINESS

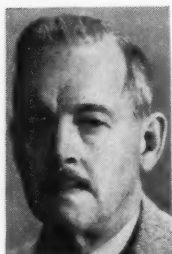
**STANDARD PRESSED STEEL CO.**

JENKINTOWN, PENNA., BOX 799

Boston • Chicago • Detroit • Indianapolis  
St. Louis • San Francisco



**F. J. SHEPARD, JR.**, treasurer of Lewis-Shepard Products, Inc., has been elected president of the Electric Industrial Truck Assn. He recently retired as chairman of the Material Handling Division of the American Society of Mechanical Engineers. **W. Van C. Brandt**, manager of motive power sales Electric Storage Battery Co., was named vice-president, and **Charles F. Kells** managing director of the organization, secretary treasurer.



F. J. Shepard, Jr.

**E. J. HEIMER** has resigned, effective February 1, as president of Barrett-Cravens Co., to devote full time to Heimer Equipment Co., Oakland, Calif.

**JOHN A. ROEBLING'S SONS CO.**, through E. C. Low, vice president in charge of sales, has announced the appointment of **L. H. Van Dike, Jr.**, as Detroit representative. He replaces the late **Harry T. Hirbe**, who died last November 24 in his thirty-first year with the company. **Van Dike**, a graduate of Dartmouth College and Tuck School of Business Administration, has been with Roebbling since 1946.

**THERMOID CO.** has announced personnel changes as follows: **Jack Brand**, Colorado industrial sales at Denver; **J. J. Chamberlain**, industrial sales in Washington and northern Oregon at Seattle; **E. J. Dunlap**, industrial sales in northern California and southern Oregon at San Francisco; **A. Fred Matheis**,

industrial sales promotion manager at Trenton; **H. William Overman**, manager of industrial friction materials division, office moved to Detroit; **Jack Wright**, industrial and oil field sales in Utah, Idaho, Wyoming, Montana and Western Canada, at Salt Lake City.

**PROMOTIONS** of **George G. Raymond, Jr.**, to sales manager; **William L. Peck**, assistant sales manager; **Frank Forsberg**, factory manager, and **Seth Wiley**, purchasing agent, have been announced by **George G. Raymond**, president of **LYON-Raymond Corp.**

**L. S. BEALE**, secretary of the Wirebound Box Manufacturers Assn., has been elected chairman of the manufacturing trade group of the National Industrial Council, an affiliate of the National Assn. of Manufacturers.

**CHARLES GEO. BECK** has taken charge of sales for Ideal Stencil Machine Co., Belleville, Ill. Along with three other officers, he is one of the principal stockholders in the company. **Ideal** has manu-



factured stencil machines and supplies for shipping rooms for over 30 years.

**JAMES McKEE BARCLAY**, who was formerly first vice president in charge of field work for **Drake, Startzman, Sheehan and Barclay**, has opened an office at 29 East 37th St., New York City,

as a distribution and material handling consultant.

**C. F. A. GRAY** has been placed in charge of the Montreal sales office recently established by **Syntron Co.**, manufacturers of electromagnetic vibratory material handling equipment and tools.

**WESTINGHOUSE ELECTRIC Corp.** has announced the appointment of **John E. Payne**, formerly manager of industrial sales, to manager of all industry sales departments. He will be succeeded as manager of industrial sales by **R. S. Kersh**, manager of the Houston office since 1942. Both men will be located in the East Pittsburgh plant.

**APPOINTMENT** of **W. E. Maden** as sales and division manager of the Conveyor Division of **George Haiss Mfg. Co.**, wholly-owned subsidiary of **Pettibone Mulliken Corp.** He has been associated with the conveyor industry for 20 years, serving as sales and division manager for **A. B. Farquhar & Co.** from 1931 to 1947.

**DR. JAMES J. PYLE** has been elected to the board of directors of **Locke Insulator Corp.** He is director of General Electric's Plastics Division laboratory at Pittsfield, Mass.

**J. G. GREEN** has been appointed midwestern representative of **Reading Chain and Block Corp.**, with offices in Chicago. During the past five years, he was assistant general manager of **Philco Storage Battery Division**.

**HENRY V. ERBEN** has been elected vice president by the board of directors of **General Electric Co.** In his present capacity, he is general manager of the Apparatus Department, largest of the seven G-E operating departments. **Charles E. Wilson**, president, announced.

**DON S. GREER**, vice president in charge of sales for **J. W. Greer Co.**, of Cambridge, Mass., has been named to head the new general sales office in Chicago.

## MATERIAL HANDLING SURVEY PROCEDURE . . . (Continued from page 63)

can be evaluated in terms of costs. Savings can be estimated for any method to determine if the cost of purchase, installation and operation of new equipment will be amortized in a reasonable time.

### Prescribing the Materials Handling System

After studying the cost figures in applying the principles of efficiency, the surveying engineer can detail the material handling system best suited to the findings. The system should be tailored to the handling requirements of the proposed production, to the physical features of the plant and to the investment limits prescribed by the owners.

The detail of the recommended system should include the required number of each type of conveying unit, the quantity, size and style of containers and carriers, and the enumeration of the auxiliary facilities that will develop the full efficiency of the handling equipment.

The surveying engineer will find numerous cases where the solution of problems is dependent also on the effective control of production and materials. Equipment alone cannot take the place of production planning and materials control.

The engineer's recommendations for layout and machinery will be based to some degree on production management. His proposal cannot be considered complete unless it includes suggestions to management on such planning functions.

### Reporting on the Survey

A considerable amount of figures and facts are accumulated in the course of investigations in a material handling survey. These form the basis for the planning that leads up to the formulation of the recommendations. Although the recommendations are the results, and therefore the purpose of the survey, they alone do not constitute a complete record of the work, nor do they comprise a satisfactory statement to management.

The parties who will authorize



**MATERIAL HANDLERS, INC.,** Charlotte, N. C., Lewis H. Fallis, president, and J. Toms Dover, secretary-treasurer, have announced the formation of a company, as listed above, to sell material handling equipment. They will act as sales engineers for mono-rail systems manufactured by Loudon Machinery Co. in North Carolina and belt, roller, skid, chute and bucket conveyors produced by Olson Mfg. Co., in North and South Carolina. They will also be agents and engineers for ball bearings, sheaves, clutches, roller bearings made by Dodge Mfg. Corp. Both men have been engaged in the material handling business prior to establishing their own company.



L. H. Fallis

**FOUR** companies, **GREEN-PENNY CO.,** Los Angeles, Calif.; **NATIONAL DISTRIBUTORS,** Millville, N. J.; **FREEMAN INDUSTRIAL SERVICE,** Providence, R. I., and **W. P. & R. S. MARS CO.,** Duluth, Minn., have been appointed stocking distributors in their cities and surrounding areas by **Market Forge Co.,** material handling equipment manufacturer.

**HERNDON MACHINERY CO.,** Charlotte, N. C.: The Durant Mfg. Co., has appointed the Herndon Machinery Co. to handle the sale of Productimeter counting and measuring machines in textile and general industrial fields in North and South Carolina. Marion E. Herndon, Jr., owner and organizer, is a graduate of the North Carolina State College, with a degree in textile manufacture. He was formerly associated with the Cleveland Cloth Mills at Shelby, N. C.

**MECHANICAL HANDLING SYSTEMS, Inc.,** Detroit: A Cleveland district sales and engineering office has been opened with Robert P. Petersen in charge. The office is located in the Keith Bldg., Cleveland, and will serve northern and central Ohio. Petersen, a mechanical engineer and Armour Institute graduate, was formerly manager of the New Departure Division of General Motors.

**INDUSTRIAL SUPPLY CO.,** Minneapolis: It has been appointed distributor of the entire Hewitt Rubber Division's line of industrial hose, belting and packing. The company is headed by E. E. Rampfer, president; V. W. Olson, vice-president, and W. O.

Hansen, secretary and treasurer. Industrial Supply will service Minneapolis, St. Paul and North and South Dakota.

**PALLET ENGINEERING CO.,** San Francisco: The company has been named exclusive distributor for export and domestic sales of multiple drum and cylinder carriers by Trayner-Reinhart, the manufacturers.

**BETTER PACKAGES, Inc.,** Shelton, Conn.: Three changes in territory distributors have been announced by Mills W. Waggoner, sales manager. Howell Putnam has moved from Cleveland-Northern Ohio to Detroit; Talley Albert has been shifted from Detroit to distributor for the state of Georgia, and Luke Laughner, from Connecticut to Cleveland.

**MERCURY MFG. CO.:** Territory of J. R. Lewis, Cleveland-Buffalo representative, has been increased with the addition of the Cincinnati area previously served by John R. Henkle, who died recently. The office will be maintained in the Chamber of Commerce Bldg., Cincinnati.

**ELECTRIC PRODUCTS CO.,** Cleveland: Gordon J. Berry, vice-president, has announced the establishment of three offices along the West Coast. The agents are William J. Cottrell, 342 Sherlock Bldg., Portland, Ore.; Donald T. Elliott, 921 Howard St., San Francisco, and H. D. Easterbrook, 1262 South Boyle Ave., Los Angeles.

**MORMAN BELTING AND SUPPLY CO.,** Milwaukee: The company has been appointed by Parker Appliance Co. as a distributor. The Morman organization will stock many parts for immediate service to industrial users in Wisconsin and will be available for consultation on installation and service problems. The Parker District Office in Chicago will continue to give application engineering and special product service in the area.

**ADDISON-SEMMES,** Racine, Wis.: Immediate national distribution of the new light-weight Addison-Semmes paper pallets has been achieved through agreement of Automatic Transportation Co. to handle the line through its 60 sales representatives in 48 states it was announced by officials of both companies.

**ST. LOUIS RAILWAY SUPPLY CO.,** St. Louis, Mo., has been appointed distributor of Robins Conveyor Division equipment, it was announced by J. H. Hayden, vice president in charge of sales for Hewitt-Robins, Inc.

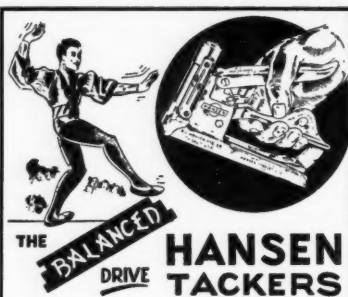


## 1/4 - MILLION "RAZORBACK" PALLETS Made in 1947

When we made over one-quarter million "Razorback" Pallets in 1947—and sold them to 187 nationally-known companies—and when these companies sent in REPEAT orders—we think that PROVES the quality of our pallets! If you want BETTER pallets, write for our new descriptive folder.

### ARKANSAS PALLET CORP.

Plant in Pine Bluff—Address All  
Correspondence to Box 153  
Pulaski Hgts. Sta., Little Rock, Ark.



IT'S no trick with Hansen, with its *Balanced Drive*, to tack more labels or tags or line more boxes, in less time, with minimum effort, and keep shipments on the go.

Faster and safer than hammer and tacks—neater than glue with its goo—Hansen quickly and securely labels shipments, for neat appearance and safe arrival.

Alike in shipping, assembly or production, the zip-zip action of the Hansen Tacker, light weight and easy portability, speed up all kinds of jobs that require tacking or fastening.

**A. L. HANSEN MFG. CO.**  
5010 HAVENWOOD AVE. CHICAGO 40 ILL.

the program of alterations and equipment installations will need to know the amount of the expenditures involved, the estimated savings that will result and an approximation of the time required to amortize the investments. Presentation of the observed facts and the reasoning applied in the formulation of recommendations, is quite necessary to the "selling" of the program.

The most satisfactory means of recording the work and presenting the plans is with the formal report. The extent of the survey will determine the number of reports that should be prepared, as separate papers are desirable for each of the distinct phases of the project. A summary report may be prepared at the end of the survey, to give the over-all picture and to outline the interlocking of the several phases.

It is well to include prints of equipment and layout drawings, if any were prepared, and any formal proposals or estimates that may have been received from vendors or contractors. Exhibits of this nature may be bound with the reports to which they pertain, or all included together in a folder or file submitted with the summary report.

All work sheets accumulated during the Survey should be classified and filed for future reference, along with a set of copies of the reports. This will complete the procedure.

A Survey that is well planned and executed can be completed at a cost of around five per cent of the expenditure for installing the whole program. Even in cases where the survey recommendations are not acted upon, it is probable that one or more of the findings can bring about savings in excess of the survey costs.

\* \* \*

NEXT MONTH the first of the prize-winning papers in the cost reduction contest will be presented. Subsequent issues will also feature additional papers given at the second Material Handling Exposition.

## AID MANPOWER...SPEED MATERIALS HANDLING

THE NEW **"STREAMLINER JR."**

It takes only one man to raise or lower the new "Streamliner Jr." with its exclusive hydraulic lifting arrangement. Of sturdy welded construction—the standard booster operates at 45 feet per minute... is equipped with "Diamond Casters" for maximum mobility... can be "anchored" in any desired location by simply "flipping" the caster base. Positive tightening prevents the booster bed from slipping back. Write for full details today.

\* Trade Mark Reg. U. S. Pat. Off.

**HARRY J. FERGUSON COMPANY**  
WHEEL • PORTABLE BELT • BELT  
AND ROLLER GRAVITY CONVEYORS  
121 WEST AVENUE, JENKINTOWN, PENNA.



## ON THE PALLET . . .

(Continued from page 44)

facturing Co., is Vice-President of Materials Handling.

One of the duties of the newly elected officers, at their first meeting in Chicago recently, was the appointment of I.P.E.A.A.'s Directorate for the year 1947-1948. These new directors are as follows:

H. C. Bristoll, The Stanley Works, New Britain, Conn.; A. L. Green, Association of American Railroads, Chicago, Ill.; Maxwell A. Goodwin, Clark Equipment Co., Chicago, Ill.; A. C. McGeath, American Box Board Co., Chicago, Ill.; H. W. Newton, American Paper Co., Milwaukee, Wis.; R. A. O'Reilly, Jr., General Motors Corp., Detroit, Mich.; I. J. Stoller, Fibleco Illinois Corp., Chicago, Ill.; S. H. Tompkins, Crescent Paper Co., Indianapolis, Ind.; M. C. Weisenhorn, Jiffy Mfg. Co., Hillside, N. J.; J. G. Witte, Montgomery Ward & Co., Chicago, Ill.

**T**HE American Management Association announced that its 17th annual Packaging Exposition, largest in the history of the event, will be held April 26-30, 1948, in the Public Auditorium at Cleveland, Ohio. Approximately 200 exhibitors will utilize 100,000 square feet to display developments in packaging, packing and shipping machinery, equipment, materials, design and services which are used in the manufacture and sale of virtually every product in the nation's commerce.

# SAVES

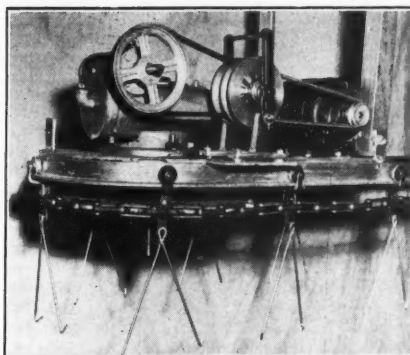
"Saves \$600 a year in shipping room," say users of Marsh Stencil Machines, Brushes, Inks! WFB, railroads, trucks recommend stenciling. Three sizes to meet Gov't Spec., 1", 3/4", 1/2". For sample stencil, Shippers' handbook prices, pin this to business letterhead, with your name.

**MARSH STENCIL MACHINE CO.**  
67 Marsh Bldg., Belleville, Ill., U. S. A.

## MARSH

### STENCIL MARKING

## KEYSTONE JUNIOR CONVEYORS



100% prefitted. Bolted joints. No track welding, cutting, or fitting required for installation. Easily installed. Low first cost. Overhead or floor supported. Load capacity 75# per trolley. Rivetless Drop Forged chain 2" pitch. Ball-bearing trolleys.

KEYSTONE JUNIOR CONVEYORS are identical to their big brothers—the 348 and 458 conveyors, which are the accepted standard throughout the world. The Keystone Junior picks up where the 348 leaves off. Handling loads of 75# per trolley or live loads of up to 10,000# it is a Little Giant. Caterpillar or Corner Drives available. Vertical turns as small as 2' Radius. Horizontal turns as small as 9' Radius. Rotating hooks available for use in spray booths, ovens, etc. Conveyor speeds from 3-I.P.M. to 80 F.P.M. available.

Write for Bulletin No. 947

**BEVERIDGE MILLWRIGHT SERVICE, INC.**  
7376 Grand River Ave. Detroit 4, Mich.

### The SMALL hoist with the BIG hoist features

The Titan is a compact, lightweight, electric hoist; easily installed, simple to operate. It is inexpensive to buy, costs practically nothing to operate, handles loads up to 750 pounds; is fast and makes handling safer for both men and materials.

Ask For further information on this time saver and production increaser; also for Titan Bulletin 801.

## Titan

### ELECTRIC HOIST

- 1 Trolley Suspension for traveling on a monorail.
- 2 Hook Suspension—hang up and use anywhere.
- 3 Plug In—use single phase lighting current; but made also for multi-phase power.
- 4 Cone Drive—continuous contact, the latest in worm gearing.
- 5 Push-Button Control; quick, convenient and safe.

**DETROIT HOIST & MACHINE CO.**  
8216 Larrow Street  
Detroit 11, Mich.

## DETERMINING PALLET SIZES . . .

(Continued from page 33)

size of pallets that may be used, on what size pallet do you secure the best all around patterning without excessive overhang, underlap or voids between containers?

### II. NATURE AND EXTENT OF THE OPERATIONS.

- (a) Is the palletized operation to be carried on wholly within the confines of a plant or warehouse, or do you contemplate a transportation movement as an integral part of your palletized program?
- (b) If transportation is involved, will it be to your own plants, branches or warehouses, or to others into whose program the pallet size should be integrated. If the latter is the case, it may be necessary to limit both the pallet dimensions and unit load weight so as to permit handling with the customer's equipment.
- (c) If transportation is contemplated, will you be loading refrigerator cars requiring operation of mechanized equipment over floor racks?
- (d) Will you also be loading boxcars or other types of rail equipment?
- (e) Will you likewise be loading various types of motor transport equipment?

Each of the aforementioned imposes

certain considerations in determining proper pallet size.

### III. PHYSICAL LIMITATIONS IMPOSED BY EXISTING PLANT PROPERTIES.

Unless your plant properties are of modern or heavy plant construction, with car and truck level docks, you may find many factors which tend to restrict or influence the size of pallets. Other factors that must be considered are:

- (a) Will you operate in and out of refrigerated coolers with limited door width and height?
- (b) Will you operate through aisles or other limited passageways that would govern the width of your pallet and the height of the load?
- (c) What about the free and unrestricted stacking heights in your various storage areas?
- (d) If your operation is within a multi-storied warehouse or plant, elevator platform sizes and carrying capacities will have a direct bearing on the size of pallet best adapted to your use.

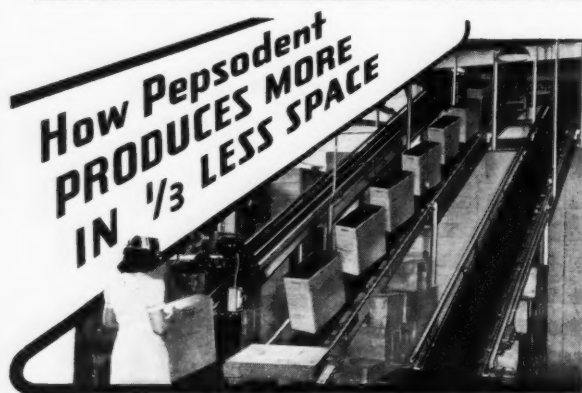
Last, but not least, there is a definite relationship between the cubicle volume of a given warehouse area, the floor load capacity, and the weight and stacking height of merchandise on pallets of a given size. For example, there would be little or no object in using a 48" x 48" pallet on which a 3,000-pound load could be palletized and only stacked two high because of floor load limitations, when a smaller size pallet with less weight and greater height could be stacked three high without floor overload and thus per-

mit more nearly maximum utilization of warehouse cube.

After carefully weighing all of these factors, and many others, it seemed that a size other than the two recommended for standardization by the Bureau of Standards was best adapted to our materials handling program.

The following is an explanation of the basis for our conclusion. The most critical vehicle is the refrigerator car, generally 99 inches in width, and with a door only 44" to 46" wide. It was felt that a pallet 42" wide would readily pass through the car door, where it would be set down, picked up again from the 48" side and set in position.

However, sample loads proved that a 42" pallet load cannot be easily carried through the 44" to 46" door, for slight unevenness in the bridge plate, irregularities in the load, and so forth, made it necessary to use extreme caution to prevent the load from scraping the doorway and this caution necessitated very slow movement. Further experiments were conducted with a 40" x 48" pallet and the same conditions were found to exist to practically the same extent. Eventually a pallet of 32" in width was tried and it was found that this size load could be moved through the car doorway, without undue caution, at regular operating speed, turned and placed in the car in a pattern of three pallets abreast, thus utilizing 96" of the 99" car width. This operation requires no transfer to a second machine and can therefore be done by one man. It was also found that the combination of the 48" and 32" dimensions made good utilization of the widths of truck



### with an A-F ENGINEERED CONVEYING SYSTEM

In the Pepsodent plant, an A-F ENGINEERED Conveyor System saves valuable floor space. A-F Overhead Belt Conveyors feed production lines and special conveyors handle bottles for antiseptic production. The lines shown here rise from carton machines to belt work tables on the floor above. At night the lines act as storage banks.

A-F Engineers will help you solve YOUR handling problem just as efficiently. Write today for folder describing various types of installations.

#### THE ALVEY-FERGUSON CO.

434 Disney St. Established 1901 Cincinnati 9, Ohio  
Offices in Principal Cities, Coast-to-Coast



THANK  
YOU. . . .

For Taking Time From  
the Material Handling  
Show to Visit Us!

Due to Sales Made During the Show Our Unbalanced Inventory Prevents Us From Listing Specific Makes and Sizes of Industrial Trucks Available. Let Us Have Your Inquiry, We'll Try to Fill It.

### HARRY M. RIGHTER, Inc.

CLEVELAND 2, OHIO—Phone ATlantic 1631, 7:30 to 4

Foot of W. 45th St.—Former American Shipbuilding Yard—  
First turn toward lake west of High Level Bridge off Bulkley  
Blvd. 5 minutes from Square.

OWNED, OPERATED AND MANNED BY VETERANS OF WORLD WAR II

bodies. These advantages were weighed against the need of procuring and handling approximately 25 percent more pallets, because of the smaller size, and it was decided that the faster movement, greater maneuverability and the need for only one man with one piece of equipment for the smaller pallet outweighed the disadvantages.

Because of the need for picking up the pallets from either the long or the short side in order to properly place them in cars and trucks, the use of a four-way pallet became mandatory. Tests proved that the patterns developed for the 32" x 48" pallet conformed to this size and with fewer voids in the load than was possible with any of the other pallet sizes.

In addition to better patterning, we also had to give consideration to the relationship of the weight of the equipment plus pallet load to floor capacity limitations with some of our plants, and more particularly the movement over floor racks of refrigerator cars and motor transport equipment. Because of these conditions, and the nature of our products as well as the glass containers in which many of them are packed, a 2,000 pound unit load was established as maximum on finished goods. This weight can be reached at the optimum height of approximately 48". Tests have proven that this weight in floor load pounds, at an average height of 48" per pallet, affords most advantageous use of stacking clearances.

Thus, Kraft is using pallets of three of the four sizes, but the 32" x 48" pallet appeals to us as the most effi-

cient and economical size pallet for all around use and will adequately fulfill 90 to 95 per cent of our pallet requirements.

I am confident that the engineers and research men in whose hands we place our materials handling problems will give to industry the most highly specialized and efficient type of equipment. It is one of the last phases of industrial operation which affords vast improvement in efficiency and economies. I am looking forward to the day when a high percentage of the articles of commerce which flow in regular quantities through normal channels will move from one location to another in unit loads on pallets. Our short experience with palletization has brought about some extremely gratifying results. At plants and branches where we are now palletized, our loading and unloading time over the previous method of manually handling each package or series of packages, reflects approximately a 75 percent saving. We haven't begun to scratch the surface of the possibilities we visualize through a completely effective coordination of this newer method of materials handling in the production, warehousing and distribution of our products.

Condensation of a paper delivered at Second Material Handling Exposition (Cleveland, January 12-16, 1948). Additional papers will appear next month.

## CONSULTING ENGINEERS DIRECTORY

Delos M. Palmer & Associates  
Consulting Engineers  
Electrical, Mechanical, Industrial  
Processing, Plant Layout  
Machine Design, Product Development,  
Special Problems  
Toledo 4, Ohio  
733 Nicholas Bldg. GA. 3775

### PROFESSIONAL LISTING

A new department for professional services, the Consulting Engineers Directory, makes its first appearance in this issue. This department has been instituted as a result of frequent requests for such space. It will be restricted to announcements offering services of persons or firms engaged in material handling and related engineering fields. For rates, address communications to Consulting Engineers Directory, FLOW, 1240 Ontario St., Cleveland 13, Ohio.



### EASY MATERIALS HANDLING

BURRO takes materials handling jobs like this in stride . . . does them with the same smooth speed and economy characteristic of this powerful, speedy locomotive crane, whether it's working with clamshell bucket, tongs, magnet, drag-line bucket or hook.

BURRO's heavy draw bar pull (7500 lbs.) and fast travel speeds (up to 22 MPH) make it an efficient switch engine too. You can spot cars *where* and *when* you want them, eliminating the "waiting time" which interrupts production and increases costs.

Write for illustrated Bulletins.  
There is no obligation.

CULLEN-FRIESTEDT CO., CHICAGO 23, ILL.

1320 South Kilbourn Avenue

Chicago, Illinois

Metal conveyor belts  
made to your measure

by **CYCLONE**

CYCLONE engineers can design a metal conveyor belt to give better, longer service under the particular operating conditions at your plant. That's because Cyclone's *three* basic belt styles (Chain Link, Flat Wire and Flex-Grid) can be made in a wide range of metals, alloys, finishes, and mesh and wire sizes. When made to proper specifications, Cyclone Metal Belts can withstand heat, steam, water, oil and chemicals. Take advantage of Cyclone's 25 years of experience in the production of metal belts for industry.

Cyclone offices are in principal cities . . . factories in the Mid-West and on the Pacific Coast. Write for new free catalog No. 4.

By the makers of Cyclone Fence  
**CYCLONE FENCE DIVISION**  
(American Steel & Wire Company)  
Dept. A-28 Waukegan, Illinois  
United States Steel Export Co., New York



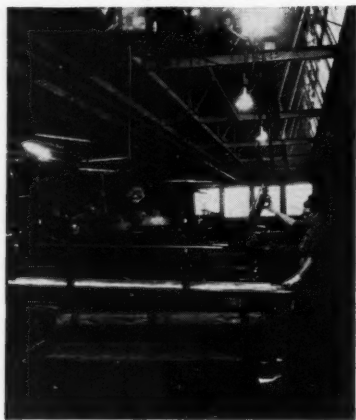
UNITED STATES STEEL



## MOTORIZED LIFTER EASES HANDLING OF SHEETS

**T**RANSFER of sheet metal requires a minimum of employee effort at East Moline Works of International Harvester Co. where a motorized grab is utilized for this operation.

Bundles of sheet metal are received in the shear department by roller con-



veyor from the sheet metal storage area. With the aid of a completely motorized electric bridge crane and motorized sheet metal grab, stock is transferred from the roller conveyor to the shears or temporary intermediate storage. Employees' effort in this heretofore difficult job is confined to operation of extended pendant controls.—Courtesy, International Harvester Co., East Moline Works.



Faster, Safer, Easier  
Way to Handle Barrels

## SAFETY ONE-MAN BARREL TRUCK

Easy for one man to handle up to 1000 lb. barrels, drums, quickly, safely. Simply engage sliding hook in rim of barrel, pull handles slightly—hold with foot. That's all! Loads, unloads automatically. Trucker never touches barrel. Load balanced perfectly. No arm strain. Welded steel, rubber tires, Hyatt bearing. Low priced. Try one. Return collect if not "best yet."

**THOMAS**

TRUCK & CASTER CO.  
4863 Mississippi River  
Keokuk, Iowa

# Sterling Pallets

LIVE UP TO  
THEIR NAME

### 1. Seasoned Hardwood

Long life  
Low maintenance cost  
Relatively light weight

### 2. Uniform Quality

Made in our own plant  
under close supervision

Our big volume of repeat orders tells the story. Call Pallet Division.

## Sterling

Lumber and Supply Co.

11900 S. Halsted St.

Chicago 28

Phone PULman 0221

## REVOLVATOR GO-GETTER POWER LIFTRUCK

(Skid Platform Type)



Finger touch directional controls on handle lift loads up to 6,000 lb., move truck forward or backward, and gently drop loaded skid where wanted. Delayed action motor control and dead-man controlled hydraulic braking. Adjustable Timken bearings throughout. Maximum safety, efficiency and durability.

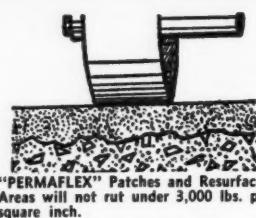
High lift and pallet types available. Also Portable Elevators, Hydraulic Lifts, Red Giant Liftrucks and other material handling equipment. Send for Bulletins.

**REVOLVATOR CO.**

DESIGNERS AND MANUFACTURERS OF MATERIAL HANDLING EQUIPMENT

8739 Tonnele Ave., North Bergen, N. J. Since 1904

## Use "PERMAFLEX" Resurface and Patch INDUSTRIAL FLOORS



"PERMAFLEX" Patches and Resurfaced Areas will not rut under 3,000 lbs. per square inch.



OLD MASTICS RUT and DENT under 200 lbs. per square inch.

### BONDS PERFECTLY—NEVER COMES LOOSE

No Chipping Required—Install directly over your old concrete, wood, brick, or stone floors, walks or drives. Interior or Exterior.

### HEAVY DUTY—SLIPPROOF—RESTFUL DUSTPROOF—WATERPROOF—QUIET

Many users apply "PERMAFLEX" over new concrete to prevent wearing away of the concrete under truck wheels and thus preserve structural strength.

The most severe trucking conditions in 400 of the largest industrial plants show no destructive effect on "PERMAFLEX" after years of use.

### AMAZING! UNBELIEVABLE! UNTIL YOU TRY "PERMAFLEX"

Users include U. S. Steel, Bethlehem, Republic, General Motors, A. O. Smith, Western Electric and leading Railroads.

Test 100 square feet—be convinced.

WRITE FOR LITERATURE AND TRIAL OFFER

INSTALL  
COMPLETE  
12½¢  
per square  
foot

**PERMAFLEX PRODUCTS COMPANY**  
1840 North Front Street  
Philadelphia, Pa.

BRANCH OFFICES  
ATLANTA...999 Humphries St., S. W.—Phone Main 4110  
CHICAGO...347 N. Loomis St.—Phone Haymarket 8020  
CLEVELAND...1429 W. Clifton Blvd., Lakewood—Phone Academy 2273  
DETROIT...6432 Cass Ave.—Phone Madison 6300  
ALBANY, N. Y...Erie & Champlain Sts.—Phone Albany 4-8229

NEW YORK...100 W. 42nd St.—Phone Wisconsin 7-8474  
SAN FRANCISCO...1 Drumm St.—Phone Garfield 3198  
SPRINGFIELD, MASS...214 Birnie Ave.—Phone Springfield 7-3512  
BUFFALO...1200 Niagara St.—Phone Garfield 4886  
ST. LOUIS...828 Clark Ave.—Phone Main 4927



## ADVERTISERS IN THIS ISSUE

	Page		Page
Acme Steel Co.....	45	Pallet Engineering Co.....	12
Ajax Box Co.....	47	Pallets, Inc.....	62
Alvey Ferguson Co.....	68	Delos M. Palmer.....	69
American Monorail Co.....	6	Palmer-Shille Co.....	72
Appleton Electric Co.....	33	Permafex Products Co.....	70
Arkansas Pallet Corp.....	66	Powell Pressed Steel Co.....	10
Automatic Transportation Co.....	1		
		Rapids Standard Co.....	13
Barrett-Cravens Co.....	5	ReBo Mfg. Co.....	58
Beall Pipe & Tank Co.....	52	Revolator Co.....	70
Beveridge Millwright Co.....	67	Harry M. Righter, Inc.....	68
Bigelow Garvey Lumber Co.....	71	Rolock, Inc.....	40
Brummeler Steel Products Corp.....	42	Rollway Bearing Co.....	8
		Rotary Lift Co.....	61
C & D Batteries, Inc.....	16		
Camp Co.....	53	Schwitzer Cummins Co.....	31
City Machine Co.....	62	Sermat Conveyor Co.....	49
Chisholm Moore Hoist Co.....	32	Standard Conveyor Co.....	62
Clark Tractor Div.....	34 and 35	Standard Pressed Steel Co.....	63
Cullen Friestedt Co.....	69	Steel Parts Mfg. Co.....	55
		Sterling Lumber Co.....	70
Darnell Corp., Ltd.....	54		
Detroit Hoist & Machine Co.....	67	Thomas Truck & Caster Co.....	70
Dings Magnetic Co.....	39	Towmotor Corp.....	2
		Truckman, Inc.....	Inside Back Cover
Thomas A. Edison, Inc.....	4		
Euclid Crane & Hoist Co.....	59	U. S. Steel Corp.....	69
Fab.-Weld Corp.....	62		
Harry J. Ferguson Co.....	66		
General Electric Co.....	11		
General Tire & Rubber Co.....	14		
Gould Storage Battery Corp.....	7		
A. L. Hansen Mfg. Co.....	66		
Harnischfeger Corp.....	Inside Front Cover		
W. F. Hebard Co.....	56		
Hertner Electric Co.....	41		
Homer Mfg. Co.....	40		
Hyster Co.....	43		
Industrial Pallet Co.....	57		
Lanham Hardwood Flooring Co.....	59		
Marsh Stencil Machine Co.....	67		
Mathews Conveyor Co.....	50		
May-Fran Engineering Co.....	71		
Merrill Brothers.....	53		
Mobilift, Inc.....	9		
Moto-Truc Co.....	57		
The Nolan Co.....	71		
Nutting Truck & Caster Co.....	27		
Orangeville Mfg. Co.....	61		
Otis Elevator Co.....	15		
Ozark Pallet Co.....	63		

# PALLETS

**MADE TO YOUR  
SPECIFICATIONS!**

From Air Dried Hardwoods

**ALSO  
BOX PALLETS  
BULKHEADS  
CRATES**

*Write and tell us your needs  
or send us your detailed prints  
for quotation.*

Over 25 Years

**BIGELOW-GARVEY  
LUMBER CO.**

326 W. Huron St. Chicago 10, Ill.  
Phone: WHitehall 5252

MILLS: Arkansas - Georgia - Wisconsin  
Minnesota

**WORLD'S EASIEST  
WAY TO OPEN ANY  
BOX CAR DOOR**

**MONARCH ONE MAN  
CAR DOOR OPENER**



One man can open the most binding, balky box car door with the Monarch Car Door Opener. Get greater safety . . . speed loading and unloading schedules . . . order an ample supply to fill your needs today!

• No strained muscles. No slips or falls. No broken arms, legs or mashed fingers. No fatalities. No time wasted. No "gangs" needed. No time loss.

Write for free descriptive literature.

ONLY \$22.50 EACH  
F.O.B. Bowerston

**The Nolan Company**

Dept F, Bowerston, O.



**The  
"LITTLE HUSTLER"  
TRANSFERS STAMPINGS  
AS FAST AS PRODUCED!**

The "Little Hustler" is fully portable and quickly adjustable to a wide range of applications. The 8 foot size shown above has a maximum delivery height of 81 inches at 45° and 50 inches in a horizontal position. Made in 13 models: 4-6-8-10 and 12 ft. long, by 12", 18" or 24" wide. Also special sizes. Send for circular LHC. We design and manufacture permanent conveyor systems and all types of SPECIAL EQUIPMENT.

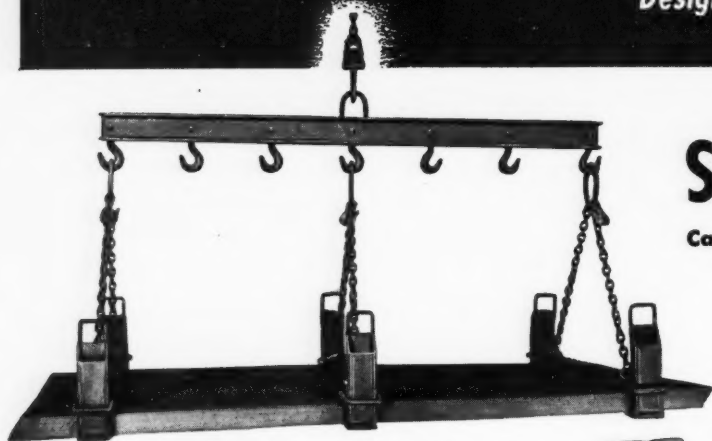
**MAY-FRAN  
ENGINEERING, INC.**

Development Engineering and Manufacturing  
1710 Clarkstone Rd. Cleveland - Ohio

**PALMER-SHILE**

# MATERIALS HANDLING EQUIPMENT

*Designed to do Specific Jobs Better*



**NS-364 Complete**  
(3 ton capacity)  
**\$1500**

**B-704 Complete**  
(5 ton capacity)  
**\$2250**

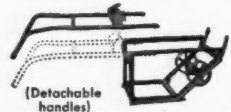
## SHEET STEEL GRAB

Capacity 1, 2 and 3 tons (1 ton per sling)

Adaptable to any size lift of sheets within 0" to 9" in thickness, 18" to 48" in width, any length. For short bundles use one grab without beam, for average bundle use two grabs—for long, flexible bundles use three grabs. As illustrated, handles three tons. Holds without slippage, distortion or damage to stock. Adjustable for low head room. Supporting beam 6 feet long—carefully engineered and heavily constructed for extra safety and service.



**Combination Truck and Drain Rack**



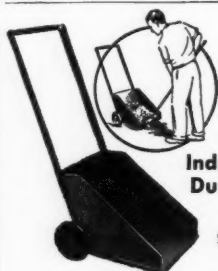
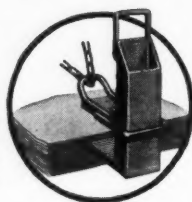
Automatically loads barrels up to 1,000 lbs. with ease. Heavy all welded angle iron frame, tubular handles, free rolling wheels. Detachable handles for storage.



**B-290 T Box \$1865**

12 gauge steel plate square trunnion box—18" x 18" x 24". (Minimum lots of 10.) Wt. 80 lbs.

**We Design and Build** all types of pick-up, loading, moving, shipping, dumping and storage materials handling equipment.



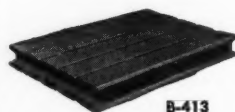
**Industrial Dust Pan**  
**S-703 \$1950**

Sturdy, light to handle. Basket 16 gauge sheet steel 18" x 18" x 18"—frame all welded construction—8" rubber, ball bearing wheels. Wt. 45 lbs.—capacity 1 bushel.



**B-205 \$1500** **Drum and Barrel Sling**

Handles barrels, drums, kegs—anything with a lip. Half ton capacity. Heavy welded chain and forged grab hooks. Wt. 8½ lbs.



**B-413**  
**Double Face All Metal Pallet**  
Built for extra heavy duty—two way—for power fork truck only. Special rolled steel, corrugated. (Other sizes, types to order.)



**Two Wheel Hand Truck**  
With safety knuckle guards—straight back for handling boxes, crates, bags, etc. Heavy 7" nose plate. Reinforced welded angle iron frame.

**B-439ML \$2450**  
20" wide, 48" high, metal wheels

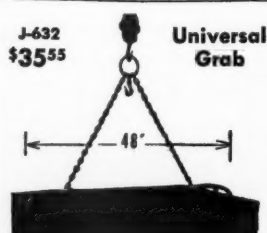
**B-439RL \$2825**  
20" wide, 48" high, rubber tired wheels

**B-439MS \$2000**  
18" wide, 42" high, metal wheels

**B-439RS \$2500**  
18" wide, 42" high, rubber tired wheels



**Turn Table Tilt Truck**  
All purpose use in warehouse or factory—turns in own radius. Platform 1½" hardwood 48" x 28"—reinforced. Roller bearing wheels—two swivel type. Wt. 75 lbs.



**J-632 \$3555** **Universal Grab**

Hook type, picks up heavy boxes, crates, bales, from 16" to 48" across. Heavy forged steel hooks with adjustable spread. Capacity 2,000 lbs.

### When Ordering

give item number to prevent error. All weights approximate, all prices f.o.b. Detroit, Mich. Prices subject to change without notice.

DESIGNED AND MANUFACTURED BY

**Palmer Shile Co.**  
16012 Fullerton Ave., DETROIT 27, MICH.



**\$775.00**

F. O. B. Jackson

**Get the Facts**

Write for New  
Model D Folder

**"truck-man**  
*Reduced Cost*

OF MATERIAL HANDLING

**30%"**

(Operator's statement on file)

Enthusiastic owners report even more startling savings after installing Truck-Man's modern hydraulic lift and speedy power. From small tool and die shops, warehouses,

plants covering acres come stories of Truck-Man versatility, economy and dependability. Here are some of the ways it will save YOU time and money:



Users get 8 hours of continuous operation per gallon of gas.



Truck-Man turns in its own length!



9 out of 10 of all shop loads are LESS than 1 TON.

● **Truck-Man lifts and hustles with ease** skidded capacity loads—without dangerous starting and dropping shocks—with sure, fingertip control...

● **Snakes into holes from narrow aisles**—turns in its own length... Increases usable floor space...

● **Handles easily with compact, light, simple controls**—anyone can operate without fatigue...

● **Speeds briskly on straightaways**—creeps in crowded aisles and close squeezes... Two speeds forward or reverse...

● **Drives on big, dual pneumatic tired wheels** for traction and riding comfort... Heavy solids carry load with ample safety factor...

● **Stands the gaff** because it's engineered for dependability... Volume production and time-proven standard replacements mean low first cost and repairs...

● **Cuts costs of fuel, labor and maintenance**... And many owners praise the flexibility of their *three* Truck-Man units where they formerly used one heavy costly truck... It's easy to buy, economical to own, faithful in service!

*Over 70 Truck-Man distributors in principal centers provide standard service.*

Ask Any Operator About  
**truck-man**  
truck-man INC. Jackson, Mich.

1418 West Ganson,





## *It Was a Great Show*

PRESS-TIME FOR THIS ISSUE CONFLICTED WITH THE  
CLOSE OF THE SECOND NATIONAL MATERIAL HANDLING  
EXPOSITION. A PRELIMINARY REPORT IS ON PAGE 17, TO  
BE FOLLOWED BY A MORE DETAILED ONE NEXT MONTH.  
PHOTO SHOWS THE BUSY *Flow* BOOTH.

# *Flow*